

Stanislaus County Employees' Retirement Association

832 12th Street, Ste. 600, Modesto, CA 95354 • PO Box 3150, Modesto, CA 95353 • www.stancera.org • 209-525-6393 • 209-558-4976 Fax

AGENDA

BOARD OF RETIREMENT 832 12th Street Ste. 600, **Wesley W. Hall Board Room** Modesto, CA 95354

The Board of Retirement welcomes you to its meetings, which are regularly held on the third Wednesday of each month. Your interest is encouraged and appreciated.

CONSENT ITEMS: These matters include routine administrative actions and are identified under the Consent Items heading.

PUBLIC COMMENT: Matters under jurisdiction of the Board, may be addressed by the general public before or during the regular agenda. However, California law prohibits the Board from taking action on any matter which is not on the posted agenda unless it is determined an emergency by the Board of Retirement. Any member of the public wishing to address the Board during the "Public Comment," period shall be permitted to be heard once up to three minutes. Please complete a Public Comment Form and give it to the Chair of the Board. Any person wishing to make a presentation to the Board must submit the presentation in written form, with copies furnished to all Board members. Presentations are limited to three minutes.

BOARD AGENDAS & MINUTES: Board agendas, minutes and copies of items to be considered by the Board of Retirement are customarily posted on the Internet by Friday afternoon preceding a meeting at the following website: www.stancera.org.

Materials related to an item on this Agenda submitted to the Board after distribution of the agenda packet are available for public inspection at StanCERA, 832 12th Street, Suite 600, Modesto, CA 95354, during normal business hours.

AUDIO: All Board of Retirement regular meetings are audio recorded. Audio recordings of the meetings are available after the meetings at http://www.stancera.org/agenda.

NOTICE REGARDING NON-ENGLISH SPEAKERS: Board of Retirement meetings are conducted in English and translation to other languages is not provided. Please make arrangements for an interpreter if necessary.

REASONABLE ACCOMMODATIONS: In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the Board Secretary at (209) 525-6393. Notification 72 hours prior to the meeting will enable StanCERA to make reasonable arrangements to ensure accessibility to this meeting.

- 1. Call Meeting to Order
- 2. Roll Call
- 3. <u>Announcements</u>
- 4. Public Comment
- 5. Consent Items
 - a. Approval of the January 24, 2017 Meeting Minutes View
 - b. Monthly Staff Report View
 - c. 2017 Cost of Living Adjustment View
 - d. Fiscal Year 2016-2017 Mid-Year Budget Review View
 - e. Bank of New York Mellon Foreign Exchange Transaction Litigation View
 - f . Approval of Service Retirement(s) Sections 31499.14, 31670, 31662.2 & 31810
 - 1. Aguiar, Dorothy BHRS Effective 02-02-17
 - 2. Brennan, Sheryl Ag Comm Effective 02-18-17
 - 3. Bridges, William GSA Effective 02-14-17
 - 4. Card, Susan CSA Effective 02-18-17
 - 5. Carpenter, Cheryl Ceres Effective 02-05-17
 - 6. Casas, Belinda CSA Effective 02-04-17
 - 7. Castro, Denise Auditor Effective 12-30-16
 - 8. Childers, Brook Probation Effective 02-18-17 *
 - 9. Dysert, Kimberlee CSA Effective 02-15-17
 - 10. Linn, Judith HSA– Effective 01-18-17

February 28, 2017 1:30 p.m.

- 5. <u>Consent Items(Cont.)</u>
 - 11. Martin, Debra CSA Effective 02-17-17
 - 12. Mull, Cynthia CSA Effective 02-16-17
 - 13. Perez, Anita BHRS Effective 02-07-17
 - 14. Silva, Jill Probation Effective 02-18-17 *
 - * Indicates Safety Personnel
 - g. Approval of Deferred Retirement(s) Section 31700
 - 1. Arellano, Maria DCSS Effective 01-26-17
 - 2. Crabtree, Janis Stan Regional 911 Effective 01-11-17
 - 3. Mulhollen, Nadia Sheriff Effective 02-04-17
 - 4. Sanders, Theresa SBT Effective 01-10-17
 - 5. Vargas, Feliciana CSA Effective 11-12-16
 - h. Approval of Death Benefit Sections 31781, 31781.1 and 31781.3
 - 1. Parmley, Linda, Deceased January 30, 2017, Active Member
 - i. Approval of Disability Retirement Section 31724
 - 1. Drury, Lisa, Health Services Agency, Non-Service Connected, Effective 01-21-17

6. <u>Executive Director – Administrative</u>

- a. Discussion and Action Regarding Bartel Associates Actuarial Review of June 30, 2015 Actuarial Valuation and July 1, 2012 through June 30, 2015 Experience Study <u>View</u>
- b. Discussion and Action Regarding 2016 Preliminary Actuarial Valuation Results View
- c. Legal/Legislation Update
- d. Information Technology Solutions (ITS) Project Update View

7. Investment Manager Annual Presentation

- a. LEGATO 1. Value Added <u>View</u>
- b. Jackson Square Partners 1. Value Added <u>View</u>
- 8. <u>Executive Director Investment</u>
 - a. Discussion and Action Regarding StanCERA Schedule of Directives; Directives #2 and #3 View
- 9. Verus Investment Consultant
 - a. Flash Report January 30, 2017 View
 - b. Investment Performance 2016 Quarter 4 Review View
 - c. Discussion and Action Regarding Search for Risk Parity Mandate View

10. <u>Closed Session</u>

- a. Recommendation for Non-Service Connected Disability Retirement for Jeannette Apolinar Section 31533
- b. Conference with Legal Counsel Pending Litigation One Case: O'Neal et al v. Stanislaus County Employees' Retirement Association Stanislaus County Superior Court Case No. 648469 Government Code Section 54956.9(d)(1)
- c. Conference with Legal Counsel Pending Litigation One Case: Stanislaus County Employees' Retirement Association v. Buck Consultants, LLC, Mediation Pursuant to Evidence Code Sections 1115, 1119, 1152 Government Code Section 54956.9(d)(4)
- 11. Members' Forum (Information and Future Agenda Requests Only)
- 12. Adjournment



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BOARD OF RETIREMENT MINUTES January 24, 2017

1. Call Meeting to Order

Meeting called to order 1:30 p.m. by Trustee Gharat, Chair

2. Roll Call

Trustees Present:	Donna Riley Jim DeMartini, Michael O'Neal, Jeff Grover, , Mandip Dhillon, Mike Lynch, Darin Gharat, Sam Sharpe and Jegan Raja for Gordon Ford
Trustees Absent:	Gordon Ford
Alternate Trustee	Joan Clendenin, Alternate Retiree Representative
Staff Present:	Rick Santos, Executive Director Kellie Gomes, Executive Board Assistant Kathy Herman, Fiscal Services Manager Dawn Lea, Member and Employer Services Manager
Others Present:	Fred Silva, General Legal Counsel Ed Hoffman, Investment Consultant

3. Announcements

Kellie Gomes announced as stated at last meeting the Rotation of Officers: - Pursuant to Bylaws Section 1.5, Trustee Darin Gharat is Chair of the 2017 Board of Retirement and Trustee Mike Lynch is 2017 Board of Retirement Vice-Chair.

Kellie Gomes announced Trustees have been provided with a hard copy 2016/2017 700 forms today and an electronic copy will be provided to you if requested. They are due back to Kellie no later than March 10, 2017.

Rick Santos, Director announced that Item 10.a (Apolinar disability) and Item 7.C (Rescind Emerging Manager Policy) have been pulled and will be placed on the February meeting for consideration.

4. Public Comment

None

- 5. Consent Items
 - a. Approval of the December 13, 2016 Meeting Minutes
 - b. Monthly Staff Report
 - c. Executive Director Goals Update Quarter 4 2016
 - d. StanCERA Complaint Log of October 1 December 1, 2016

Board of Retirement Minutes January 24, 2017 Page 2

e. Approval of Service Retirement(s) - Sections 31499.14, 31670, 31662.2 & 31810

- 1. Burt, Gary SBT Effective 01-21-17
- 2. Drury, Lisa HSA Effective 01-21-17
- 3. Farias, Gina CEO Effective 03-14-16
- 4. Hamilton, Angeline DER Effective 01-28-17
- 5. Herzog, Susan HSA Effective 01-14-17
- 6. Lasater, Jeanette BHRS Effective 01-07-17
- 7. Layne, Kathryne BHRS Effective 12-31-16
- 8. Magdaleno, Delia CSA– Effective 01-21-17
- 9. Rehder, Glenn Probation Effective 01-06-17 *
- 10. Rodriguez, Debora BHRS Effective 12-30-16
- 11. Supremo, Betty CSA Effective 01-13-17

* Indicates Safety Personnel

- 5. <u>Consent Items(Cont.)</u>
 - e. Approval of Deferred Retirement(s) Section 31700
 - 1. Barraza, Edith DCSS Effective 07-15-16
 - 2. Bauman, Magdalena BHRS Effective 08-27-16
 - 3. Bernardi, Janet CSA Effective 11-16-16
 - 4. Fleming, Rebecca Courts Effective 12-08-16
 - 5. Gozzo, Robin County Counsel Effective 10-29-16
 - 6. Le, Ngoc HSA Effective 05-18-16
 - 7. Matos, Marcia Sheriff Effective 10-04-16 *
 - 8. No, Peggy DA Effective 10-15-16 *
 - 9. Nunes, Joey BHRS Effective 10-15-16
 - 10. Shinn, Laura Alliance WorkNet Effective 10-29-16
 - 11. Sims Jr., John Children & Family Comm Effective 01-07-17
 - 12. Sperry, Marcus Probation Effective 10-01-16 *
 - 13. Vertino, Timothy Planning Effective 11-30-16

* Indicates Safety Personnel

- f. Approval of Reciprocal Disability Retirement Section 31838.5
 - 1. Leap, Latisha Probation, Service Connected, Effective 08-02-16
- g. Approval of Disability Retirement Section 31724
 - 1. Bass, Pamela Stanislaus Superior Court, Non-Service Connected, Effective 12-01-14
 - 2. Rodriguez, Rodrigo Stanislaus County, Service-Connected, Effective 12-12-15

Motion was made by Trustee Grover and seconded by Trustee Riley to accept the consent items as presented.

Motion carried unanimously

6. Liquidity Mandate

- a. Discussion and Action Regarding Liquidity Portfolio Finalist
 - Verus Update for Liquidity Mandate
 - Insight Investment Presentation
 - Dimensional Fund Advisors (DFA) Presentation

Insight and DF Advisors were interviewed by the Board for consideration of the management of the Liquidity mandate. There was some inquiry into the relationship between Insight and BNYM and the currency manipulation events in years past. Staff is researching a couple of questions that were posed during the meeting. After discussion and consideration, the following motions were made:

Motion was made by Trustee Riley and seconded by Trustee O'Neal to approve the recommendation by Ed Hoffman, Verus Consultant to allocate \$230 million to Dimensional Fund Advisors (DFA)

Motion carried unanimously

Motion was made by Trustee Grover and seconded by Trustee Riley to approve the recommendation by Ed Hoffman, Verus Consultant to allocate \$100 million to Insight Investments

Motion passed 8 to 1 with the following roll call vote :

Trustee Riley	Yes
Trustee DeMar	tini Yes
Trustee O'Neal	Yes
Trustee Grover	Yes
Trustee Dhillior	n Yes
Trustee Lynch	No
Trustee Gharat	Yes
Trustee Raja	Yes
Trustee Sharpe	Yes

Motion was made by Trustee O'Neal and seconded by Trustee Raja to authorize staff to engage Scott Smith of Hanson Bridgett LLP to complete the legal review, and assist with negation and execution of contracts with DFA and Insight. After legal review is completed, authorize the Executive Director to enter into agreement with DFA and Insight.

Motion passed 8 yes votes with Trustee Lynch abstaining with the following roll call vote:

Trustee	Riley	Ye	s
Trustee	DeMartini	Ye	s
Trustee	O'Neal	Ye	s
Trustee	Grover	Ye	s
Trustee	Dhillion	Ye	s
Trustee	Lynch	abs	stain
Trustee	Gharat	Ye	s
Trustee	Raja	Ye	s
Trustee	Sharpe	Ye	s

7. <u>Executive Director – Investment</u>

a. Discussion and Action Regarding the Investment Policy Final Draft

Motion was made by Trustee Dhillion and seconded by Trustee Grover to approve the Investment Policy Final Draft as presented.

Motion carried unanimously

b. Discussion and Action Regarding Investment Directive #1, Asset Allocation

Motion was made by Trustee O'Neal and seconded by Trustee Dhillion to approve Investment Directive # 1

Motion passed 8 to 1 with the following roll call vote:

Trustee Ril	еу	Yes
Trustee De	Martini	Yes
Trustee O'l	Neal	Yes
Trustee Gr	over	Yes
Trustee Dh	illion	Yes
Trustee Ly	nch	No
Trustee Gh	narat	Yes
Trustee Ra	ja	Yes
Trustee Sh	arpe	Yes

c. Discussion and Action Regarding the Emerging Manager Policy

Item pulled and will return at the February Board meeting

8. <u>Verus – Investment Consultant</u>

- a. November 30, 2016 Flash Report
- b. December 31, 2016 Flash Report

9. <u>Executive Director – Administrative</u>

a. Legal/Legislation Update

Dawn Lea updated the Board on AB 2833 which requires more extensive disclosure on alterative type investments. For the most part, StanCERA already reports on a number of the requirements in AB2833. Staff is consulting with legal counsel and will reach out to those managers that will be affected by AB2833.

b. Information Technology Solutions (ITS) Project Update

Dawn Lea gave an update on the ITS project. Kick off took place recently and required documents are currently being drawn up. Additionally, the project to convert all files to electronic images is set to commence in early March.

c. Discussion and Action to Accept the 2017 Executive Director Goals

Motion was made by Trustee Grover and seconded by Trustee Lynch to accept the 2017 Executive Directors Goals as presented.

Motion carried unanimously

10. Closed Session

Motion was made by Trustee Grover and seconded by Trustee Sharpe to move in to closed session at 3:49 p.m.

Motion carried unanimously

- a. Recommendation for Non-Service Connected Disability Retirement for Jeannette Apolinar Section 31533
- b. Conference with Legal Counsel Pending Litigation One Case: Stanislaus County Employees' Retirement Association v. Buck Consultants, LLC, Mediation Pursuant to Evidence Code Sections 1115, 1119, 1152 Government Code Section 54956.9(d)(4)
- c. Conference with Legal Counsel Pending Litigation One Case: O'Neal et al v. Stanislaus County Employees' Retirement Association Stanislaus County Superior Court Case No. 648469 Government Code Section 54956.9(d)(1)

Motion was made by Trustee Lynch and seconded by Trustee O'Neal to move in to open session at 3:56 p.m.

Motion carried unanimously

11. Members' Forum (Information and Future Agenda Requests Only)

Trustee Lynch requested that staff research the disposition of the BNYM currency manipulation.

12. Adjournment

Meeting adjourned at 3:44 p.m.

Respectfully submitted,

Rick Santos, Executive Director

APPROVED AS TO FORM: Fred Silva, GENERAL LEGAL COUNSEL

By:

Fred Silva, General Legal Counsel



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February 28, 2017

Retirement Board Agenda Item

- TO: Retirement Board
- FROM: Rick Santos, Executive Director
 - I. SUBJECT: Monthly Staff Report
 - II. ITEM NUMBER: 5.b
- III. ITEM TYPE: Information Only
- IV. STAFF RECOMMENDATION: None
- V. ANALYSIS:
 - a) Member & Employer Services During the month of January 2017, Member and Employer Services Staff processed 39 new hires (4 Safety and 35 General), 34 terminations, 11 estimates and 5 buy backs. There were 45 individual counseling sessions.

January marked the official kick off of the first phase of the Tegrit project. Staff began meeting with the Analysts from Tegrit and the Consultants from Linea to establish the criteria for the back file conversion of our existing paper files to electronic documents.

Staff continue to audit member files in anticipation of the data conversion that will be required with the implementation of a new pension administration system.

- b) Fiscal Services January is probably one of our busiest months for processing paperwork. Member statements, 1099R and 1099 Misc as well as the retiree payroll were all processed and mailed. Employer and employee contributions totaling \$9,946,849 were received through 16 different payroll batches. In addition, 22 contribution refunds and death benefit payouts totaling \$170,393 were processed. The retiree payroll for January of \$9,282,087 was processed as scheduled. Staff also began the process of contract negotiation for the first three investment strategies approved by the Board necessary to implement the FFP Asset Allocation.
- *c)* Investment Governance and Compliance Staff has been working on the recruitment for the Investment Officer position which is expected to be filled just prior to the end of the fiscal year. The initial recruitment closed on February 24th and staff will begin the interview process in March. Staff has also begun the migration of investment data over to an access database. This migration has happened earlier than expected and is nearly complete. Staff has also transitioned some of the auxiliary investment reports from being excel driven to being Access driven. Routine work regarding the Investment Directives continues.

Retirement Board – February 28, 2017 Monthly Staff Report Page 2

- VI. RISK: None
- VII. STRATEGIC PLAN: Strategic Objective IV: Refine StanCERA's business and policy practices in ways that enhance stakeholder awareness, the delivery of member services and the ability of the Organization to administer the System effectively and efficiently*
- VIII. ADMINISTRATIVE BUDGET IMPACT: NONE

Rick Santos, Executive Director

Kathy Herman, Fiscal Services Manager

Dawn Lea, Member and Employer Services Manager



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February 28, 2017

Retirement Board Agenda Item

- TO: Retirement Board
- FROM: Rick Santos, Executive Director
 - I. SUBJECT: 2017 Cost of Living Adjustment
 - II. ITEM NUMBER: 5.c
- III. ITEM TYPE: Consent
- IV. STAFF RECOMMENDATION: Approve Cheiron's recommendation for a 3% Cost of Living Adjustment (COLA) to StanCERA retired member's monthly benefit beginning April 1, 2017
- V. EXECUTIVE SUMMARY: Attachment 1 contains Cheiron's recommendation for a 3% Cost of Living Adjustment beginning April 1, 2017 for all StanCERA retired members. Attachment 2 contains the recalculation of the COLA banks for current retirees.

Currently, StanCERA bases its COLA increases on the All Urban Consumer Index for the San Francisco-Oakland-San Jose area. Each year, StanCERA staff examines the predictive power in this particular index and evaluates whether the Organization should continue to use this index to calculate its annual cost of living adjustments. After examining data from different indices and economic variables that may have some predictive power explaining changes in inflation for our area, staff still believes that the San Francisco-Oakland-San Jose Index explains more of the change in inflation for this region than other potential indices.

VI. ANALYSIS: Each year, the StanCERA actuary calculates the cost of living increase in StanCERA's retiree benefits by looking at the December over December change in the All Urban Consumer Index for the San Francisco-Oakland-San Jose area. The change in this index over calendar year 2016 indicates a change of over 3% in inflation. Since the annual increase that can be awarded is capped, this amounts to a 3% increase for all retirees.

Once again, staff examined other indices and some other economic variables that could potentially explain changes in inflation for this region better than the index currently being used. Staff found no indication that changes in perceived Stanislaus County inflation is more closely correlated with another index.

Difficulties in estimating cost of living increases for the region

There are two main difficulties in estimating what annual cost of living increases should be for StanCERA retirees:

- 1. There is no published and/or widely accepted measure of inflation for Stanislaus County or our specific region
- 2. Even if there were an accepted measure of local inflation, there most likely is no published index that correlates closely with that measure

Several systems are currently struggling with this very issue and staff will continue to monitor any potential solutions that come from this. However, staff did attempt to estimate the correlation between the potential indices and inflation variables in Stanislaus County.

Comparison to other indices

Staff analyzed inflation data from 4 indices published on the Bureau of Labor Statistics website and compared that data to reported inflation figures for Stanislaus County from the Department of Transportation. The analysis focused mainly on R-square, a statistical measure of the strength of the explanatory power of a particular index on Stanislaus County inflation. A measure of 100% means the index perfectly explains all of the change in Stanislaus County inflation each year and a measure of 0% means the index has no predictive power whatsoever. The following table displays the R-square statistic for each index under consideration:

Index	R-Square
San Francisco	46.7%
West Region	27.3%
Los Angeles	27.1%
All Urban Consumer U.S. Cities	3.5%

Thus, of the 4 indices that could conceivably be used to estimate changes in inflation for our region, the San Francisco-Oakland-San Jose Index explains nearly half of the changes in Stanislaus County inflation each year. Unfortunately, the methodology the Department of Transportation uses to measure inflation specifically for Stanislaus County is complicated and uses several simplifying assumptions. To compensate, staff analyzed actual economic data from Stanislaus County that could have some correlation with inflation in our region.

Comparison to other economic variables

Since the Department of Transportation's inflation figures for Stanislaus County may be viewed with some skepticism, staff analyzed several economic variables specific to our County. Staff measured the correlation (R-square) between these specific economic variables and the same 4 potential indices that can be used to estimate retiree cost of living adjustments. While the R-square measure is relatively low for each variable, it is still clear that of the 4 potential indices, the San Francisco-Oakland-San Jose index still has the highest correlation with these economic measures than most of the other indices.

Index	Per Capita Income	Total Employment	Construction Employment	Taxable Retail Sales
San Francisco	12.8%	4.9%	8.7%	8.7%
West Region	4.7%	0.17%	0.21%	1.2%
Los Angeles	4.7%	0.15%	0.6%	0.5%
All Urban US Cities	0.0%	11.1%	10.8%	0.5%

While the All Urban US Cities Index appears to explain more of the change in employment for the Stanislaus County region, the San Francisco Index is still far superior when compared to the Los Angeles and West Region Indices in all economic measures.

Retirement Board – February 28, 2017 2017 Cost of Living Adjustment Page 3

- VII. RISK: None
- VIII. STRATEGIC PLAN: Strategic Objective IV: Refine StanCERA's business and policy practices in ways that enhance stakeholder awareness, the delivery of member services and the ability of the Organization to administer the System effectively and efficiently.
- IX. ADMINISTRATIVE BUDGET IMPACT: None

Rick Santos, Executive Director

Kathy Herman, Fiscal Services Manager

CHEIRON 🧩

February 7, 2017

Mr. Rick Santos

Executive Director Stanislaus County Employees' Retirement Association 832 12th Street, Suite 600 Modesto, CA 95354

Re: Cost of Living Adjustment (COLA) as of April 1, 2017

Dear Rick:

Pursuant to the scope of retainer services under Cheiron's agreement to provide actuarial services to the Stanislaus County Employees' Retirement Association (StanCERA), we have computed the Cost of Living Adjustment (COLA) percentages to be used as of April 1, 2017. The calculations outlined herein have been performed in accordance with 31870.1 of the County Employees Retirement Law of 1937.

Background

The cost-of-living-adjustment (COLA) is determined annually based on increases in the December Consumer Price Index (CPI) for All Urban Consumers in the San Francisco-Oakland-San Jose area, using a base period of 1982-1984. The ratio is calculated, and rounded to the nearest one-half percent.

COLA Calculations

The CPIs described above were 269.483 and 260.289 for December 2016 and December 2015 respectively. This represents an increase of 3.532%, which is rounded to 3.50%. As a point of comparison, the U.S. City CPI increased by only 2.07% over the same time period. The difference between the rates of increase in the Bay Area versus the U.S. average CPI was driven by the high rate of housing inflation (referred to as the "Shelter" component by the Bureau of Labor and Statistics) in the Bay Area. The increase in the average Bay Area CPI for all items excluding shelter was only 1.07% during the period.

Retirees – other than members of Tier 3 - are subject to the provisions of Section 31870.1, which limits annual COLA increases to 3.0% annually. Therefore, these members should receive an increase in benefits of 3.0%, based on the current year change in the CPI. The carry-over balances will increase by 0.5%, based on the difference the rounded CPI increase versus the current year COLA adjustment. The enclosed exhibit summarizes the COLA calculations and carry-over balances for these Tiers. Tier 3 members do not receive an automatic COLA from the Association.

Mr. Rick Santos February 7, 2017 Page 2

Please contact us if you have any questions regarding these calculations.

Sincerely, Cheiron

Greher Schiel

Just & Migh

Graham A. Schmidt, ASA, EA, FCA, MAAA Consulting Actuary

Jonathan Chipko, FSA, EA, FCA, MAAA Consulting Actuary



STANISLAUS COUNTY EMPLOYEES' RETIREMENT ASSOCIATION

COST OF LIVING ADJUSTMENTS (COLA) - Section 31870.1 As of April 1, 2017

Maximum Annual COLA: 3.0%

		April 1, 2016	Increase	in the	April 1	, 2017
			Ann	ual		
		Accumulated	Average	e CPI		Accumulated
Initial Retire	ment Date	Carry-Over			COLA	Carry-Over
			Actual	Rounded		
		(A)	(B)	(C)	(D)	(E)
On or Before	e 4/1/1970	66.5%	3.53%	3.5%	3.0%	67.0%
04/02/1970 to	04/01/1971	64.0%	3.53%	3.5%	3.0%	64.5%
04/02/1971 to	04/01/1972	62.0%	3.53%	3.5%	3.0%	62.5%
04/02/1972 to	04/01/1973	61.0%	3.53%	3.5%	3.0%	61.5%
04/02/1973 lo	04/01/1974	60.3% 57.5%	3.33% 2.53%	3.3% 2.5%	3.0%	01.0% 59.0%
04/02/1974 l0	04/01/1975	50.5%	3.53%	3.5%	3.0%	51.0%
04/02/1975 to	04/01/1970	13.5%	3.53%	3.5%	3.0%	J1.0 %
04/02/1970 to	04/01/1978	41.0%	3 53%	3.5%	3.0%	41.5%
04/02/1977 to	04/01/1979	36.5%	3 53%	3.5%	3.0%	37.0%
04/02/1979 to	04/01/1980	30.0%	3 53%	3.5%	3.0%	30.5%
04/02/1980 to	04/01/1981	24 5%	3 53%	3.5%	3.0%	25.0%
04/02/1981 to	04/01/1982	12.5%	3 53%	3.5%	3.0%	13.0%
04/02/1982 to	04/01/1983	2.5%	3.53%	3.5%	3.0%	3.0%
04/02/1983 to	04/01/1984	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1984 to	04/01/1985	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1985 to	04/01/1986	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1986 to	04/01/1987	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1987 to	04/01/1988	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1988 to	04/01/1989	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1989 to	04/01/1990	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1990 to	04/01/1991	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1991 to	04/01/1992	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1992 to	04/01/1993	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1993 to	04/01/1994	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1994 to	04/01/1995	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1995 to	04/01/1996	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1996 to	04/01/1997	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1997 to	04/01/1998	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1998 to	04/01/1999	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/1999 to	04/01/2000	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2000 to	04/01/2001	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2001 to	04/01/2002	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2002 to	04/01/2003	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2003 lo	04/01/2004	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2004 lo	04/01/2005	0.0%	3.53%	3.3% 2.5%	3.0%	0.5%
04/02/2005 to	04/01/2000	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2000 to	04/01/2007	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2007 to	04/01/2008	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2000 to	04/01/2000	0.0%	3 53%	3.5%	3.0%	0.5%
04/02/2010 to	04/01/2011	0.0%	3 53%	3.5%	3.0%	0.5%
04/02/2011 to	04/01/2012	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2012 to	04/01/2013	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2013 to	04/01/2014	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2014 to	04/01/2015	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2015 to	04/01/2016	0.0%	3.53%	3.5%	3.0%	0.5%
04/02/2016 to	04/01/2017	0.0%	3.53%	3.5%	3.0%	0.5%

¹ All Urban Consumers, San Francisco-Oakland-San Jose Area (1982-84 base). (G.C. 31870.1)



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February 28, 2017

Retirement Board Agenda Item

TO: Retirement Board

FROM: Kathy Herman, Fiscal Services Manager

- I. SUBJECT: Fiscal Year 2016-2017 Mid-Year Budget Review
- II. ITEM NUMBER: 5.d
- III. ITEM TYPE: Consent
- IV. STAFF RECOMMENDATION: Accept Mid-Year Administrative Budget Review for Fiscal Year 2016-2017 (Attachment 1)
- V. EXECUTIVE SUMMARY: Each year staff prepares a budget of general operating expenses for review and approval by the Board of Retirement (Board). Typically, there were few unexpected expenses and one budget presentation annually had been sufficient. With the Board's 2014 directive to move forward with updating the information systems, and the following request for proposals and vendor selection for pension software, the Fiscal Year 2016-2017 budget of \$5,098,833 was finalized after several adjustments on September 27, 2016. A formal mid-year review has also been put into place with Fiscal Year 2016-2017 expenses as of December 31, 2016 shown below.

STANISLAUS COUNTY EMPLOYEES' RETIREMENT ASSOCIATION FISCAL YEAR 2016-2017 Mid-Year Budget Review			
Discription	Fiscal Year 2016-2017 Final Budget	Fiscal Year 2016-2017 Mid Year Actual	
Salaries & Benefits	1 760 959	752 686	
Technology	134.350	56.316	
I.T.S. Projects RFP & Procurement	52,945	31,557	
Legal Counsel & Services	425,000	253,907	
County Support Services	148,466	64,919	
Communication & Printing	74,000	23,536	
General Operations	101,500	59,838	
Fiduciary Education & Travel	175,000	46,453	
CAPITAL EXPENDITURES Pension Administration System & Back File Conversion IT. Consulting Services for Pension Project	1,378,810 610,000	-	
Project Room, Equipment Furniture	20,000	5,814	
Audio Visual Equipment	20,000	5,437	
6th Floor vacant space completion	72,146	72,146	
Capital Expenditures	2,100,956	83,397	
Capital Depreciation	178,000	-	
6th Floor Lease Revenue (52,343) (26,172)			
TOTAL BUDGET 5,098,833 1,346,437			

VI. ANALYSIS:

StanCERA's budget is within expected ranges for mid-year. Salary and benefits are tracking as expected with some additional hours having been worked to facilitate the member file audit project, however expenditures are expected to stay within budget.

The Technology budget includes the maintenance, support, and disaster recovery for the current pension software system as well as County Information Technology (I.T.) services, computers

Retirement Board – February 28, 2017 Fiscal Year 2016-2017 Mid-Year Budget Review Page 2

and other I.T. related equipment used by StanCERA staff and is within range of approved funding. The Information Technology Solutions (I.T.S.) Project RFP and Procurement only includes the remainder of the procurement contract for Linea Solutions at this time. Once purchased, major software becomes a capital expense and is addressed below. Staff will continue to utilize a separate budgeting section to identify I.T. related projects outside of the Pension Software implementation.

StanCERA contracts with several specialized legal service providers which are utilized as needed. (Fiduciary, litigation, real estate, information technology, disability administration, tax, domestic relations and general governance) While we expect to stay within the approved funding, two service areas came in higher than expected at mid-year. 1) As requested by the Executive Director, Disability Counsel is pushing to get all applications processed quicker to better serve our members. 2) Ensuring a long term agreement and implementation plan that protects StanCERA's \$4.2 million pension software investment, prior to starting the pension software project, turned out to be more complex than originally known.

County Support Services includes building maintenance utilities, security, and mailroom services as well as some administrative services provided by the County, such as purchasing, some insurances, auditor, and personnel. StanCERA is well within budget in these areas.

Communication & Printing is basically funds set aside for postage and trustee elections, mass production of annual reports, member statements, and retiree payroll. StanCERA has suspended the production of the newsletter and other educational material at this time.

General Operation funds are used for office supplies, 6th floor building expenses and other professional services such as our financial auditor or other professional consultants.

Fiduciary Education & Travel includes fiduciary insurance, education, and educational travel for trustees, executive, and general staff and is well under budget at this time.

The pension software budget and project consulting services budget recently approved by the Board are listed as capital expenditures and will be depreciated accordingly. Since project kick off was the first week of January, no funds have been expensed for either as of mid-year. The sixth floor vacant space has been completed and the project room is in use.

Non- Administrative Expenses

Section 31596.1 of the CERL states: the following expenses shall not be considered a cost of administration to the retirement system, but shall be considered as a reduction in earnings from those investments or a charge against the assets of the retirement system as determined by the Board. These expenses are governed by individual agreements and reported in the audited financial statements presented to the Board of Retirement in the Comprehensive Annual Financial Report. The un-audited mid-year expenses are listed below.

Actuarial Fees	\$99,984
Investment Consultant Fees	\$165,282
Attorney Fees – directly related to an investment	\$1,702
Investment Manager Fees	\$2,921,598
Custodial Bank Fees	\$178,405

Retirement Board – February 28, 2017 Fiscal Year 2016-2017 Mid-Year Budget Review Page 3

- VII. RISK: Government Code section 31580.2 allows for expenditures for administrative services (other than software, hardware and computer technology consulting services) to be the greater of 0.21% of the accrued actuarial liability or \$2,000,000. In Fiscal Year 2016-2017, we continued to exercise prudence in budgeting administrative expenses and are monitoring expenses to ensure StanCERA stays within allotted appropriations.
- VIII. STRATEGIC PLAN: Strategic Objective IV: Refine StanCERA's business and policy practices in ways that enhance stakeholder awareness, the delivery of member services and the ability of the Organization to administer the System effectively and efficiently.
- IX. ADMINISTRATIVE BUDGET IMPACT: A total of \$5,098,833 was approved for the Fiscal Year 2016-2017 Administrative budget. No additional administrative funds are being requested at this time.

Herman, Fiscal Services, Manager

Rick Santos, Executive Director

	-	
Discription	Fiscal Year 2016-2017 Final Budget	Fiscal Year 2016-2017 Mid Year Actual
SALARIES & BENEFITS		Adda
Salary and Wages	1 133 465	482 372
Contract Wages	-	3 572
Employee Benefits	531 794	225 155
LT Specialist - Salary & Benefits	95 700	46 788
Salaries & Benefits	1 760 959	752 686
	1,700,000	702,000
Tuler Software Maint	19 615	22 605
Tyler Disaster Maint	40,045	23,093
StanCERA Website	2 400	220
Software & Support and Service	10,000	1 089
Computers & Equipment	11,000	738
Conjer Lease & Maint	15,000	1 896
SBT - Data Processing Services	28 365	14 202
SBT - Telecommunications	5 /65	2 620
CDT - Telecommunications	13/ 350	56 316
LTS Projects REP & Procurement	52 945	31 557
LEGAL COUNSEL & SERVICES	52,040	01,007
Legal Counsel - Disability	120 000	101 500
Legal Counsel - O'Neal vs StanCERA	100 000	01,390 075
	75,000	46 617
Legal Counsel - Information Technology	- 10,000	40,017 86 481
Legal Counsel - Nasrawi vs Stancera	_	-
Legal Counsel - StanCERA vs Buck	100 000	3 535
Medical Exams Reviews Hearings	30,000	14 709
Legal Counsel & Services	425,000	253 907
COUNTY SUPPORT SERVICES	.20,000	200,001
Building Ionitorial	1 200	246
Building Maintonanaa	1,200	340 16 755
Building Halitenance	27,500	10,755
Building Security	39,500	0.014
Control Services Mail Room Salvage	20,950	9,014
CEO/Porsonnal (true un)	20,306	4,030
Auditor	20,300	3,014
Auditor	9,000	4,403
Fulciasing Solvage & Diaposal	1,100	44 I 201
Balvaye & Disposal Bisk Managoment	1 650	1 201
Insurance (Conoral Liphility & Auto)	1,000	6,004
	1/18/166	6/ 010
	140,400	04,313
COMMUNICATION & PRINTING	04.000	7 500
Annual Reports, Trustee Elections	34,000	7,526
Postage	40,000	16,011
	74,000	23,536
GENERAL OPERATIONS		07 700
Other Professional Services	-	21,123
	30,000	14,219
Other Office Expense	8,000	4,539
our Floor Security	10,000	184
6th Floor Janitorial & Supplies	2,000	11,581
our Floor taxes (Downtown Redevelopment)	20,000	1,218 275
Rehalance & Correction of 6th floor HVAC	30,000	-
General Operations	101 500	59 838
FIDUCIARY EDUCATION & TRAVEL	,	00,000
Professional Publications & Subscriptions	6 000	-
Staff Education & Travel	30 000	- 10 087
Professional Memberships	11 000	6 655
Trustee Education & Travel		26 205
Trustee Meeting Allowance	13 000	3 500
Insurance (Fiduciary & Auto)	75,000	6,000
Fiduciary Education & Travel	175 000	46 453
CAPITAL EXPENDITURES		10,100
Pension Administration System & Back File Conversion	1 378 810	-
IT Consulting Services for Pension Project	610 000	-
Project Room, Equipment Furniture	20,000	5 91/
Audio Visual Equipment	20,000	5,014
Adulo visual Equipilient	20,000	3,437
our riour vacant space completion	72,140	72,146
Capital Depresention	2,100,956	83,397
Capital Depreciation	1/8,000	-
	(52,343)	(20,172)



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February 28, 2017

Retirement Board Agenda Item

- TO: Retirement Board
- FROM: Natalie Elliott, Retirement Accountant
 - I. SUBJECT: Bank of New York Mellon Foreign Exchange Transaction Litigation
 - II. ITEM NUMBER:5.e.
- III. ITEM TYPE: Consent
- IV. STAFF RECOMMENDATION: None
- V. ANALYSIS: During the January 24, 2017 Board of Retirement meeting, a presentation was made by Insight, a prospective liquidity manager for StanCERA, who is owned by Bank of New York Mellon (BNYM). There was inquiry as to the relationship between Insight and BNYM and staff was directed to research two questions posed.

Question #1 – Where in the process is the litigation regarding BNYM and their foreign exchange transaction practices?

In 2011, a lawsuit was filed by the New York Attorney General after a whistleblower complaint was filed and researched. The complaint alledged that BNYM earned \$2 billion over ten years through deception. In March 2015, BNYM admitted to a "statement of facts" that alleged the bank misrepresented the pricing and execution of Standing Instruction foreign currency transactions made on behalf of their clients. The admission was part of a \$714 million settlement with U.S. Governemnt, State of New York, Securities and Exchange Commission (SEC), Department of Labor, and class action litigation. The bank agreed to provide detailed information about inter-bank exchange rates and the actually-settled buy-sell rates for its clients as part of the settlement. The bank also agreed to avoid using the misleading phrases "best execution", "free", or "netting" in any communication about its standing instruction foreign exchange services. BNYM also fired the Head of Product Management as well as other executives responsible for the misrepresentations. In May 2016, BNYM agreed to pay \$180 million to resolve a putative class action lawsuit brought by the State of Oregon and others alleging BNYM misled investors by making deceptive public statements about its foreign exchange program in violation of securities laws. The SEC found the bank misled certain custody clients on foreign currency transactions from 2000 to at least 2011 and in June 2016 the bank was to pay a \$30 million penalty. To date, BNYM has paid out over \$1.5 billion in digorgement representing revenue gained from the misconduct, penalties and settlements to States, U.S. Government, SEC, Department of Labor, various pension funds, and private clients. StanCERA was one of the recipients and in June 2016 received \$21,901.45 from a class action suit filed by Putnam All-Country World (Ex US) Equity Fund, LLC. Most of the major lawsuits have been settled.

This settlement is just part of an effort to clean up the foreign exchange market. In November 2014 European and U.S. regulators fined six global banks a total of \$4.3 billion for conspiring to manipulate foreign exchange rates to boost profits.

Retirement Board – February 28, 2017 Bank of New York Mellon Foreign Exchange Transaction Litigation Page 2

Question #2 – What rules or regulations have been put into place to help mitigate the risk of the custodial bank misrepresenting their fees for foreign exchange transactions?

Two regulations and one rule were violated by BNYM exercising their standing instruction foreign exchange transaction practices.

1 – Investment Company Act of 1940, Section 34(b) which prohibits any person from making any untrue statement of a material fact in any registration statement, application, report, account, record, or other document filed or transmitted pursuant to Section 31(a), and provides that it shall be unlawful for any person so filing, transmitting, or keeping any such document to omit to state therein any fact necessary inorder to prevent the statements made therein, in the light of the circumstances under which they were made, from being materially misleading.

2 – Investment Company Act of 1940, Section 31(a) which requires each registered investment company, and each underwriter, broker, dealer, or investment adviser that is a majority owned subsidiary of such a company to maintain and preserve such records for such period or periods as the Commission, by rules and regulations, may prescribe as necessary or appropriate in the public interest or for the protection of investors.

3 – Council on Foreign Relations Rule, Title 17, Section 270, Sub Section 31a-1 which requires registered investment companies to maintain accounts, books, and other documents relating to its business forming the basis for financial statements required to be filed which shall contain certain information about their transactions.

The rules and regulations have not been amended, however, in light of these violations, BNYM is required to report to the SEC once a year for three years the status of its remediation and implementation of compliance measures relating to any of the Standing Instruction FX trading programs including procedures of internal audits to ensure the effectiveness of such remedial efforts and compliance measures. BNYM is also required to report within thirty days any potential misconduct or allegations of misconduct involving the programs that BNYM discovers. During this three year review, BNYM is required to provide its external auditors with the results of the internal audits of its remedial efforts and compliance measures. And, BNYM is required to provide to the SEC any written reports, responses or recommendations provided to BNYM by their external auditors regarding the results of the internal audits.

- VI. RISK: None
- VII. STRATEGIC PLAN: Strategic Objective II: Develop efficient and effective processes for the evaluation, monitoring and disposition of StanCERA's active managers.
- VIII. ADMINISTRATIVE BUDGET IMPACT: NONE

Natalie Elliott, Retirement Accountant

Rick Santos, Executive Director



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February 28, 2017

Retirement Board Agenda Item

TO: Retirement Board

FROM: Rick Santos, Executive Director

- I. SUBJECT: Actuarial Audit of the June 30, 2015 Actuarial Valuation and the 2012-2015 Actuarial Experience Study
- II. ITEM NUMBER: 6.a.
- III. ITEM TYPE: Discussion and Action
- IV. STAFF RECOMMENDATION: Accept the actuarial audit of the June 30, 2015 Actuarial Valuation and the 2012-2015 Actuarial Experience Study
- V. ANALYSIS: In May of 2016, StanCERA contracted with Bartel Associates to perform the trienninal audit of the annual actuarial valuation and the actuarial experience study. The purpose of the audit is to receive comment and recommendation regarding the reasonableness of methodologies, calculations and assumptions used by the StanCERA actuary in performing the valuation and study.

Overall, the results of the audit are within reasonable standards of all facets of the valuation and study. However, there are some recommendations and comments that StanCERA will consider for future valuations. Staff from Bartel Associates will be on hand to present and discuss its findings with the Board and staff from Cheiron will also be present to discuss.

- VI. RISK: None
- VII. STRATEGIC PLAN: Strategic Objective IV: Refine StanCERA's business and policy practices in ways that enhance stakeholder awareness, the delivery of member services and the ability of the Organization to administer the System effectively and efficiently.
- VIII. ADMINISTRATIVE BUDGET IMPACT: None

Rick Santos, Executive Director



BARTEL SSOCIATES, LLC

Stanislaus County Employees' Retirement Association

Actuarial Review of June 30, 2015 Actuarial Valuation

And

July 1, 2012 through June 30, 2015 Experience Study

Revised January 31, 2017

BARTEL ISSOCIATES, LLC

January 31, 2017

Mr. Rick Santos Executive Director Stanislaus County Employees' Retirement Association 832 12th Street Suite 600 Modesto, CA 95353

Dear Mr. Santos:

We are pleased to present the results of our review of the Stanislaus County Employees' Retirement Association's (StanCERA's) June 30, 2015 actuarial valuation and July 1, 2012 through June 30, 2015 experience study. The purpose of our review was to verify the reasonableness of the actuarial calculations and recommendations made in those reports. Our report also comments on those calculations, methodologies and recommendations.

We would like to acknowledge the assistance of both StanCERA and Cheiron staff. Cheiron's actuaries provided timely, helpful, and thorough responses to our questions and provided the supporting information we requested.

This review was conducted by the undersigned. We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion in this report.

We would be pleased to discuss our review and this report with the Association.

Sincerely,

DRAFT

Mary Elizabeth Redding, F.S.A, MAAA, EA, FCA. Vice President Tak Frazita, ASA, MAAA, EA Associate Actuary

c: John Bartel, Marilyn Oliver, Deanna Van Valer, Bartel Associates, LLC

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This report has been prepared by Bartel Associates, LLC to present the results of our review of the June 30, 2015 actuarial valuation and the July 1,2012 through June 30, 2015 experience study of the Stanislaus County Retirement Association (StanCERA) by Cheiron. Our review was based on actuarial reports, census data, and additional information provided by StanCERA and Cheiron, and on discussions with Cheiron staff.

Overall, we believe Cheiron's actuarial work produced for StanCERA is reasonable, appropriate, and accurate, as well as following generally accepted actuarial principles and practices. We believe the experience study and the actuarial methods and assumptions selected based upon it are reasonable and overall comply with Actuarial Standards of Practice. Likewise, we find the census data work and calculation of actuarial liabilities reasonable, appropriate, and in compliance with actuarial standards of practice. Finally, we find the overall determination of the member and employer contribution rates to be reasonable. Our most significant are summarized as:

- On a percentage basis, the largest differences we found were in calculating the liabilities for Tier 3. However, due to the small size of Tier 3, the total dollar AAL difference was less than \$500,000.
- Across all groups, Bartel Associates' calculation of the Actuarial Accrued Liability as of June 30, 2015 is 0.7% larger than Cheiron's. The 2016/17 employer contribution rate that would have resulted from our valuation is 1.7% above, or 0.5% of payroll higher than the rate Cheiron calculated.

We do have several comments and recommendations for Cheiron and StanCERA based upon our review. Those comments are detailed in the following sections.

We would like to again express our thanks to StanCERA and Cheiron staff for their assistance in this project.

DRAFTDRAFTMary Elizabeth Redding, FSA, MAAA, EA, FCA Tak Frazita, ASA, MAAA, EAVice PresidentAssociate Actuary

DRAFT Deanna Van Valer, ASA, MAAA Assistant Vice President

DRAFT Marilyn M. Oliver, FSA, MAAA, EA, FCA Vice President





Purpose of the Actuarial Review

Bartel Associates, LLC has performed an actuarial review of StanCERA's June 30, 2015 actuarial valuation to provide assurance to the Association that the actuarial calculations, methods, assumptions, and conclusions are reasonable and conform to Actuarial Standards of Practice.

Scope of the Actuarial Review

The scope our review includes the following:

- 1) Conduct an independent review and analysis of the valuation results, including an evaluation of the data used for reasonableness and consistency as well as a review of mathematical calculations for completeness and accuracy.
- 2) Verification that all appropriate benefits have been valued and valued accurately.
- 3) Verification that the data provided by the system is consistent with data used by Cheiron.
- 4) Evaluation of the actuarial cost method and actuarial asset valuation method in use and whether other methods would be more appropriate for StanCERA.
- 5) Verification of the reasonableness of the calculation of the unfunded actuarial accrued liability

Methodology

Our actuarial review process consisted of the following steps:

- Compare the demographics of the 2015 data provided by StanCERA with the valuation data used by Cheiron for the June 30, 2015 actuarial valuation. Review Cheiron's data editing procedures. Process the data in accordance with Bartel Associates' procedures, taking into account additional information provided by Cheiron, and compare the results to Cheiron's valuation data.
- 2) Independently summarize StanCERA's benefit provisions. Using that, develop an actuarial valuation model. Use the actuarial assumptions in Cheiron's report, comparing those to the assumptions recommended in the experience study. Compare the benefit provisions in Cheiron's report to our independent summary.
- 3) Select "sample lives" who are individuals from each benefit tier and member status with a range of pay, service, and gender. Use the valuation model to determine actuarial liabilities for each. Obtain a summary of Cheiron's results for these same individuals. Discuss any discrepancies. Adjust the valuation model as required and appropriate.



PART 1: REVIEW OF ACTUARIAL VALUATION PURPOSE, SCOPE AND METHODOLOGY

- 4) Run the valuation model with Cheiron's valuation data, compile results by categories and compare to Cheiron's results.
- 5) Review the assets included in the valuation including calculation, allocation, and exclusion of any reserves. Review Cheiron's calculation of the actuarial valuation of assets. Determine whether the methodology is appropriate.
- 6) Review and replicate the calculation of the unfunded actuarial accrued liability and its amortization. Determine whether the methodology is appropriate.
- 7) Review and replicate the calculation of employer contribution rates. Determine whether the methodology is appropriate.
- 8) Review the complete actuarial valuation report for compliance with actuarial standards, clarity, and completeness. Present recommendations for improvement.

The remainder of Part 1 of our report presents the results of each of these steps.





The exhibit below provides a comparison by membership group and status of key data indicators in Cheiron's valuation data and the StanCERA raw data as processed by Bartel Associates. In general, the data files match very closely, with differences attributable mainly to:

- Additional transfer members included in Cheiron's valuation data. We understand these records have been added by Cheiron in order to properly value benefits for members transferred between General and Safety, or other membership groups. We verified that the service between the two records matches the total reported in StanCERA's data file.
- 2) Annualization of earnings. Cheiron's annualization procedure requires prior year earnings and hours as inputs. Bartel Associates did not have that data and so could not match the annualized earnings for certain employees.

Overall, we believe the census data is reasonable and, as used in the valuation, complies with Actuarial Standards of Practice regarding data quality. In our opinion data is adequate to support the valuation's conclusions.

Observations and Recommendations

- 1) Salaries of new members were annualized to a 2,080 hour basis and used as projected valuation salary for the coming year. For other active members whose fiscal year 2015 pensionable earnings decreased from 2014, 2015 earnings were multiplied by the number of hours worked in FY 2014 and divided by FY 2015 hours. This "annualized" pay was used as projected valuation salary for the coming year. We agree with this methodology, which is slightly conservative. However, for 6 active employees who worked more than 2080 hours in 2014 but not 2015, the process resulted in annualizing 2015 earnings to more than a 2,080 hour basis and using that amount as projected valuation salary. We recommend that the annualization be capped at 2,080 hours.
- 2) We reviewed the data checks performed by Cheiron and find them to be reasonable and to adequately screen for data errors. We did note that in certain areas a number of corrections were required to be applied to StanCERA's data. For example, several new retirees from Terminated Vested status were not added to the retiree file, and for new retirees, the benefit payment amount for July 2015 included retroactive payments. We recommend that StanCERA work with Cheiron to identify ways to improve data reporting and reduce the number of foreseeable data errors.



3) We also recommend that StanCERA maintain a record of at least the initial allocation of each retiree's pension and annuity benefit among classifications and employers. This information is necessary for an accurate valuation.

	StanCERA Data Processed			Cheir	on Valuation	Ratio Bartel/Cheiron			
	by B General	artel Associ Safety	ates Total	General	Safety	Total	General	Safety	Total
Active Participants		Succey	1000		Succy	10141	or norm	Suitty	1000
Number	3,421	723	4,144	3.421	723	4,144	100%	100%	100%
Avg. Age	45.47	38.11	44.19	45.45	38.08	44.17	100%	100%	100%
Avg. Service	10.94	10.25	10.82	10.94	10.25	10.82	100%	100%	100%
Avg. Pay (no furloughs)	\$55,396	\$67,962	\$57,587	\$55,116	\$68,004	\$57,364	101%	100%	100%
Service Retired						· · ·			
Number	2,470	348	2,818	2,472	349	2,821	100%	100%	100%
Avg. Age	69.49	64.57	68.88	69.46	64.57	68.85	100%	100%	100%
Avg. Annual Total Benefit	\$28,344	\$51,730	\$31,232	\$28,315	\$51,627	\$31,199	100%	100%	100%
Beneficiaries									
Number	323	87	410	323	87	410	100%	100%	100%
Avg. Age	72.74	66.70	71.46	72.70	66.66	71.42	100%	100%	100%
Avg. Annual Total Benefit	\$16,700	\$27,721	\$19,039	\$16,700	\$27,721	\$19,039	100%	100%	100%
Duty Disabled									
Number	108	118	226	108	118	226	100%	100%	100%
Avg. Age	67.11	57.86	62.28	67.01	57.88	62.24	100%	100%	100%
Avg. Annual Total Benefit	\$23,941	\$36,607	\$30,554	\$23,941	\$36,607	\$30,554	100%	100%	100%
Ordinary Disabled									
Number	75	7	82	75	7	82	100%	100%	100%
Avg. Age	64.44	57.03	63.81	64.36	57.00	63.73	100%	100%	100%
Avg. Annual Total Benefit	\$15,637	\$22,342	\$16,210	\$15,637	\$22,342	\$16,210	100%	100%	100%
Total in Pay									
Number	2,976	560	3,536	2,978	561	3,539	100%	100%	100%
Avg. Age	69.63	63.39	68.64	69.59	63.39	68.61	100%	100%	100%
Avg. Annual Total Benefit	\$26,600	\$44,446	\$29,426	\$26,577	\$44,395	\$29,402	100%	100%	100%
Term Vested									
Number	391	76	467	393	80	473	99%	95%	99%
Avg. Age	50.12	43.32	49.01	50.07	43.33	48.93	100%	100%	100%
Avg. Service	9.97	10.10	9.99	10.00	10.01	10.00	100%	101%	100%
Transfers									
Number	318	121	439	367	139	506	87%	87%	87%
Avg. Age	47.39	41.63	45.80	46.41	40.61	44.82	102%	103%	102%
Avg. Service	5.70	6.61	5.95	6.30	6.81	6.44	90%	97%	92%
Total Inactives									
Number	709	197	906	760	219	979	93%	90%	93%
Avg. Age	48.90	42.28	47.46	48.31	41.60	46.81	101%	102%	101%
Avg. Service	8.05	7.96	8.03	8.21	7.98	8.16	98%	100%	98%

More detailed comparisons of the census data is provided in Appendix A.





Shown below is a comparison of key valuation actuarial liabilities calculated by Bartel Associates compared to those in Cheiron's valuation report. Appendix D provides a more detailed listing of results by Tier and Status. Appendix B provides a comparison of Bartel Associates' and Cheiron's test life results.

			(AII	nounts in $\varphi($	100 sj				
	Bar	tel Associa	tes	Cheiron	Valuation	n Report	Ratio Bartel/Cheiron		
	General	Safety	Total	General	Safety	Total	General	Safety	Total
Present Value of Future Benefits (PVFB)									
Actives	994,208	358,935	1,353,143	979,480	354,297	1,333,777	101.5%	101.3%	101.5%
Terminated									
Vested	78,585	35,664	114,249	78,769	35,664	114,433	99.8%	100.0%	99.8%
Retirees	879,290	250,651	1,129,941	878,481	250,453	1,128,934	100.1%	100.1%	100.1%
Disabled	50,602	73,427	124,029	50,599	73,427	124,026	100.0%	100.0%	100.0%
Beneficiaries	55,495	29,344	84,839	55,499	29,322	84,821	100.0%	100.1%	100.0%
Total	2,058,180	748,021	2,806,201	2,042,828	743,163	2,785,991	100.8%	100.7%	100.7%
Actuarial Accrued Liability (AAL)									
Actives	715,114	238,665	953,779	704,216	235,092	939,308	101.5%	101.5%	101.5%
Terminated									
Vested	78,585	35,664	114,249	78,769	35,664	114,433	99.8%	100.0%	99.8%
Retirees	879,290	250,651	1,129,941	878,481	250,453	1,128,934	100.1%	100.1%	100.1%
Disabled	50,602	73,427	124,029	50,599	73,427	124,026	100.0%	100.0%	100.0%
Beneficiaries	55,495	29,344	84,839	55,499	29,322	84,821	100.0%	100.1%	100.0%
Total	1,779,086	627,751	2,406,837	1,767,564	623,958	2,391,522	100.7%	100.6%	100.6%
Total Normal C									
Actives	36,095	15,299	51,395	35,629	15,241	50,870	101.3%	100.4%	101.0%

(Amounts in \$000's)

Present Value of Future Benefits (PVFB) is the value today of all projected benefits for each member, taking into account the time value of money (discounting for interest until the time the benefits are projected to be paid) as well as the projected level of benefits, probability of remaining employed, and the expected lifetime of the member and beneficiary. The average ratio is 100.7%. This indicates that overall, there is a good match with Cheiron for both the benefits being projected for active employees and the actuarial assumptions.

Actuarial Accrued Liability (AAL) is the portion of the present value of future benefits deemed earned to date under the selected actuarial cost method, and the total Normal Cost is the portion of the PVFB allocated to the coming year. Under the Entry Age method used in StanCERA's valuation, this allocation is in proportion to the present value of future pay beginning from each member's entry age. For inactive members, PVFB is the same as the AAL. The average AAL ratio is 101.5 % for active members and the average total normal



cost ratio is 101.0%. This indicates that overall, there is a good match with Cheiron for present value of future pay, entry age, and valuation methodology.

Observations and Recommendations

While our overall match was good, there are specific areas where we believe benefits are not being correctly valued.

- Tier 3 inactive benefits appear to have been valued including COLA. Tier 3 members are not eligible for COLA. In addition, Tier 3 vested terminated members were valued assuming an unmodified benefit of 60% joint and survivor. The Tier 3 unmodified benefit is a 50% joint and survivor. We recommend this be corrected in the next valuation.
- 2) The Tier 3 benefit is calculated as the benefit percentage multiplied by final average salary and service, less a fraction of the projected Social Security benefit. For benefits beginning before age 65, an early retirement factor (ERF) is applied to the net benefit. (See Stanislaus County Employees Retirement Association Retirement Allowance Procedures, page 20.) Cheiron is applying the ERF only to the formula portion of the benefit and not to the Social Security offset portion. This reduces the projected benefit. We recommend that this be corrected in the next valuation.
- 3) Bartel Associates' liabilities calculated for Tier 4 are higher than Cheiron's, with the difference larger than for the other Tiers. In reviewing the sample life, Cheiron told us that they apply the 100% of pay limitation using pay without including vacation pay cash-out. In our coding, we expect that if vacation cash-out is included for purposes of the benefit calculation it should also be included in the pay used to apply the 100% of pay limitation.

Since the average General Tier 4 member is age 61 with 35 years of service, the 100% of pay limitation is projected by the valuation to apply to most members. This explains the roughly 3% difference in Tier 4 General liabilities.

We note that benefits for Tier 5 members are the same as for Tier 4. As Tier 5 members are in general younger and with less service than Tier 4, the issue described above will have less impact on the total actuarial liabilities. However, we expect that it contributes to our liabilities being about 1.5% higher than Cheiron's for Tier 5.



Conclusion

We believe our total results are within an acceptable range of Cheiron's indicating that the significant liabilities are reasonably valued.





Actuarial Value of Assets

Bartel Associates verified the market value (MVA) of assets, change in market value for the year, and Special (Non-valuation) Reserves against the fiduciary net position, changes in fiduciary net position, and reserves reported in StanCERA's 2015 CAFR. We have replicated Cheiron's calculation of the actuarial value of assets.

The actuarial value of assets (AVA) methodology used in the valuation recognizes investment returns above and below the assumed rate of return over five year periods. The resulting actuarial value is limited to be within 20% of the market value. This method is intended to smooth asset volatility in order to lower the volatility in employer contribution rates.

Observations and Recommendations

Asset smoothing method

We find the actuarial asset value methodology to be reasonable. The 5-year asset smoothing period is the most common method used by public plans.

The methodology, in our opinion, meets Actuarial Standard of Practice No. 44 since:

- 1) The AVA falls into a reasonable range around the MVA
- 2) Differences between the AVA and MVA are recognized over a reasonable period of time
- The method is not biased it is not expected to produce AVA values over or under the MVA
- 4) Realized and unrealized gains and losses are treated identically.

The methodology used also meets the "Model Practice" definition in the California Actuarial Advisory Panel's publication "Actuarial Funding Policies and Practices for Public Pension and OPEB Plans and Level Cost Allocation Model" ("CAAP.") The "model practice" lists, for example, a 5-year smoothing with a 50%/150% corridor around market value, or 10 year smoothing and a 70%/130% corridor.

As discussed in the CAAP publication, market value corridors can remove the asset smoothing effect in severe market downturns as during 2008/2009, resulting in accelerated


PART 1: REVIEW OF ACTUARIAL VALUATION RESULTS: VALUE OF ASSETS

contribution increases. We recommend that the Board consider in advance the actions it might take with regard to asset smoothing if another severe market downturn occurs.

Asset allocation

As part of the actuarial valuation, the actuary allocates assets between the County and the City of Ceres (includes the other special districts). The allocation is made by first removing assets equal to the value of benefits for all inactive members. The remaining actuarial value of assets is allocated in proportion to the actuarial accrued liability (AAL) for active members in each group. This results in the active member liabilities for each group being the same percentage funded.

This method is much simpler and more transparent than attempting to create bookkeeping accounts for each group and tracking the assets, contributions, benefit payments and expenses attributable to each. However, if in the future a change should be made that impacts the liability of only one group, this method would result in the cost of that change being spread among all groups. We recommend that the Board consider any change to the asset allocation method that might be made in advance of such a change occurring.

We note the report does not appear to contain a description of the allocation of assets or unfunded actuarial accrued liability between the general and safety classifications of either group. We recommend that this be included in future reports.





Amortization Method for Unfunded Actuarial Accrued Liability (UAAL)

StanCERA's policy regarding amortization of the unfunded actuarial accrued liability (UAAL) is limited only by the 1937 Act's requirement that it be funded over not more than 30 years. StanCERA's adopted policy is to amortize the UAAL as a level percentage of payroll over a fixed period of 21 years from June 30, 2015.

The CAAP's publication "Actuarial Funding Policies and Practices for Public Pension and OPEB Plans and Level Cost Allocation Model" provides a detailed discussion of amortization policies and expresses a preference for:

- 1) Level percentage of pay amortization
 - a. Meets the general policy goal of being a reasonable allocation of the cost of benefits to years of service
 - b. Mirrors the percentage of pay cost allocation inherent in the Entry Age cost method.
- 2) Multiple fixed amortization layers
 - a. Track UAAL components by source, increasing transparency
 - b. Avoids the "reset" needed by a single fixed period amortization policy (such as StanCERA's) when the single amortization period becomes too short to provide contribution stability.
- 3) Amortization periods of 15-20 years for actuarial gains and losses, to avoid negative amortization.

Observations and Recommendations

Under StanCERA's current actuarial assumptions (7.25% discount rate and 3.25% payroll growth) an amortization period of 21 years produces "negative amortization" meaning that the amortization payment is less than interest in the UAAL. Thus the UAAL will actually increase during the year, even if all actuarial assumptions are met and the required contributions are paid. Negative amortization will continue for two years, until the amortization period declines to 19 years. At that point the amortization payment will be slightly larger than interest on the UAAL. In subsequent years more and more of the UAAL principal will be paid each year and the balance is expected to decline, if all assumptions are met.



As the amortization period declines, any unexpected decreases or increases on the UAAL will have increasingly larger impacts on the contribution rate. Two options to alleviate this are:

- 1) Freeze the amortization period at a point where sufficient smoothing provided
- 2) Create new UAAL layers for changes to the UAAL and amortize them each over a fixed period.

We recommend that the Board discuss these options over the next few years so that a policy can be established in advance.

Determination of Contribution Rates

Overall, we have verified that Cheiron's calculations of the total UAAL and the total employer and member Normal Cost contribution rates as a percentage of payroll are reasonable and calculated accurately, reflecting the results of the actuarial valuation. We also verified that the 3-year phase-in of the effect of change in actuarial assumptions was correctly computed.

We note Cheiron's report does not contain a description of the allocation of assets or unfunded actuarial accrued liability between the General and Safety classifications of either group. A description of the allocation of administrative expense between groups is also not provided. Cheiron provided the following description of the allocation methods. Note that the UAAL and administrative expenses are allocated using different methods, which also differ from the method used to allocate UAAL between County and non-County employers.

- After splitting the unfunded actuarial accrued liability between County/Former County and City of Ceres and Other Districts, the UAAL is allocated between General and Safety on the basis of the total actuarial accrued liability (AAL).
- 2) Administrative expenses are allocated among the groups on the basis of the total nonexpense projected contribution for the year: the normal cost and UAAL contribution rates multiplied by projected payroll.

We recommend a description of the allocation method and a break-down of the actuarial liabilities and payroll into the categories needed to replicate the allocation be included in future reports.

We assume that the employer contribution rates determined in the actuarial valuation are intended to apply only to pensionable earnings, in particular, to the earnings of Tier 6



employees only up to the PEPRA limits. We recommend this be specifically stated in the report.

The following chart compares the employer contribution rates we calculated for each group, including reallocation of UAAL, as compared to Cheiron's results. Please see Appendix C for additional detail of the contribution calculation.

Conclusion

In our opinion, the resulting employer contribution rates are sufficiently close for us to conclude that the employer contribution rates developed in the actuarial valuation report are reasonable.

Bartel Associates												
	General Safety											
	County	Ceres	County	Ceres	Totai							
Total Normal Cost	19.81%	20.98%	31.81%	33.45%	22.39%							
Member Contribution Rate	9.17%	8.91%	13.46%	13.10%	10.04%							
Employer Normal Cost Rate	10.64%	12.07%	18.35%	20.35%	12.35%							
UAL Amortization	16.75%	17.34%	23.39%	21.46%	18.09%							
Administrative Expense Rate	0.86%	0.93%	1.32%	1.32%	0.96%							
Net Employer Contribution Rate	28.25%	30.34%	43.06%	43.13%	31.40%							

Cheiron Valuation Report											
	Gen	ie ral	ėty	Total							
	County	Ceres	County	Ceres	Totai						
Total Normal Cost	19.56%	20.78%	31.71%	33.16%	22.17%						
Member Contribution Rate	9.06%	8.93%	13.29%	12.88%	9.92%						
Employer Normal Cost Rate	10.50%	11.85%	18.42%	20.28%	12.24%						
UAL Amortization	16.34%	17.02%	22.82%	21.16%	17.66%						
Administrative Expense Rate	0.86%	0.93%	1.33%	1.33%	0.96%						
Net Employer Contribution Rate	27.70%	29.80%	42.57%	42.77%	30.86%						

Ratio Bartel/Cheiron												
	Gene	ral	Safe	ety	Tatal							
	County	Ceres	County	Ceres	Total							
Total Normal Cost	101.3%	100.9%	100.3%	100.9%	101.0%							
Member Contribution Rate	101.2%	99.8%	101.2%	101.7%	101.2%							
Employer Normal Cost Rate	101.3%	101.9%	99.6%	100.3%	100.9%							
UAL Amortization	102.5%	101.8%	102.5%	101.4%	102.4%							
Administrative Expense Rate	100.3%	100.1%	99.4%	99.1%	100.0%							
Net Employer Contribution Rate	102.0%	101.8%	101.2%	100.8%	101.7%							



We have performed a high-level review of the GASBS 67/68 Report as of June 30, 2015 as prepared by Cheiron. We reviewed the following:

- Total pension liability as of the June 30, 2015 measurement date to match the June 30, 2014 amount from 2014 actuarial valuation and to review the roll-forward to June 30, 2015
- 2) Market value of assets for agreement with those reported in the June 30, 2015 actuarial valuation reports
- Calculation of the collective pension expense, deferred inflows and outflows of revenue
- 4) Reasonability of the method used to allocate amounts among the cost-sharing employers.
- 5) Calculation of the employer-specific deferred inflows and outflows of resources to the cost-sharing employers.

Comments

In general we believe the amounts in Cheiron's report are calculated accurately and in accordance with our understanding of the requirements of GASB Statements 67 and 68. We have two comments.

- Cheiron stated that they did not perform the cash flow projection described in paragraph 41 of Statement 67, and instead relied on professional judgment as a sufficiently reliable alternate method. We agree with Cheiron's conclusion that this plan is very unlikely to "fail" the GASBS 67 cash flow test. However, we do not believe "professional judgment" meets the GASB's requirements of an acceptable alternative method.
- 2) The proportionate share used to allocate amounts including net pension liability among the cost-sharing employers is based on the amortization payment required from each employer. GASBS 67 requires that the determination of proportionate shares reflect the future contribution effort of each employer. The method used by Cheiron reflects only a portion of the future contribution effort that will be required by each employer – funding of the UAAL – but it does not consider the ongoing normal cost payments.

Since GASB Statements 67 and 68 are accounting and not actuarial standards, your auditors are ultimately responsible for determining whether or not this report complies with those accounting standards.



We reviewed the actuarial valuation report for compliance with the Actuarial Standards of Practice, as well for other information that might be missing or unclear to the reader. The following are our comments.

- 1) As previously discussed, the report should state the allocation method for UAAL and administrative expenses and provide the detail needed to replicate the calculation.
- 2) The service retirement rate for Safety employees aged 44-47 with over 20 years of service is listed as 10% in both the actuarial valuation report and Appendix A, proposed assumptions, in the experience study. However, the rate on the ProVal file provided to us was 5% for that age range. In addition, inspection of the expected number of retirements presented on page 20 of the experience study indicates that the actual rate was intended to be 5%. Cheiron should correct this in their next report.
- 3) The valuation report does not discuss what form of benefit participants are assumed to elect or whether this has any effect on the valuation. We recommend adding this in the next valuation.
- 4) The following comments relate to the Summary of Plan Provisions
 - a. In general, since the benefit summary is necessarily a summary, it would be helpful to cite the applicable Code sections.
 - b. PEPRA compensation is described as limited to the Social Security Wage Base. The limits are similar but not the same (\$117,200 for PEPRA in 2015 vs. \$118,500 for the SSWB).
 - c. The Summary describes categories of service that may be purchased, but the actuarial valuation and the assumptions used do not indicate to what extent service purchases impact the results.
 - Membership date is not shown in the tables describing each Tier of benefits. It would be helpful to know the criteria for eligibility in each Tier. In addition, Tier 2 is described as being open. We recommend adding that it is only open to reciprocal, non-PEPRA hires.
 - e. The age factors shown in Table 2 are incorrect for Safety 2% @ 50. The correct rate for age 50 is missing and the subsequent factors are off one year.
 - f. The report should contain more detail on Tier 3 benefits, particularly the early retirement factor and its application.
 - g. The report should contain more detail on the PEPRA benefit formulas.Particularly, the Safety PEPRA benefit formula should be noted as three PEPRA formulas are available.



PART 1: REVIEW OF ACTUARIAL VALUATION RESULTS: REVIEW OF ACTUARIAL VALUATION REPORT

- 5) We also recommend expanding the description of the basis for member contribution rates, particularly Social Security integration and the basis for COLA rates.
- 6) For clarity, we recommend the report specify that PEPRA member contribution rates are based on half of the Normal Cost including both the basic benefit and the Cost of Living benefit.
- 7) The report does not list the actuarial assumptions that were changed from the previous valuation. We believe this would be helpful to the user.





Purpose of the Actuarial Review

Bartel Associates has performed an actuarial review of the member contribution rates calculated in connection with StanCERA's June 30, 2015 actuarial valuation to provide assurance to the Association that the actuarial calculations are accurate and the methods and assumptions are reasonable.

Scope of the Actuarial Review

The scope our review includes the following:

- 1) Independently replicate the basic member contributions for each Tier.
- 2) Independently replicate the COLA rates for each Tier.
- Determine whether the rates are calculated in accordance with the requirements of the appropriate section of the CERL and whether they use the appropriate actuarial assumptions and methodology.

Methodology

Our actuarial review process consisted of the following steps:

- 1) Basic member contribution rates for each Tier were calculated in Excel spreadsheets following the appropriate sections of the CERL and using the assumptions described in Cheiron's actuarial valuation report.
- 2) COLA contribution rates were determined following Cheiron's methodology through use of the actuarial valuation model. The present value of the COLA was determined and divided by the present value of future pays for individuals at each possible entry age in each applicable tier.

The following section presents the results of each of these steps.





Basic Member Rates

We were able to match the basic member contribution rates calculated by Cheiron exactly.

Comments and Conclusion

We have several comments on the calculations, as follows.

- The actuarial valuation report states that member contribution rates are calculated assuming, among other things, an average salary increase of 3.25% per year. The actual calculation used the actuarial valuation's assumed salary increases of 3.25% plus service-based longevity and promotion increases. We recommend this be described in the next valuation report.
- 2) The actuarial valuation includes a "load" for accumulated vacation time. This means that member benefits except for Tier 6 are increased 3% (Safety) or 3.5% (General) for vacation time cashed out at retirement. The following comments relate to the application of this load.
 - a. The vacation load is generally applied to the projected retirement benefit. However, the load is not applied to members hired at the oldest two years in each schedule.
 - b. For Tier 2, which uses 3-year average pay, 1/3 of the load is applied to the projected benefit. However, this is not consistent with the valuation assumptions which state the load is applied to the projected benefit with no difference by Tier mentioned. It is also not consistent with the derivation of that assumption in the Experience Study: the load was derived by dividing vacation pay by final average earnings. If this methodology is meant to reflect vacation cash-outs equal to the load amount increasing the final year's salary, we note that there is a slight difference between increasing the final year's pay by the load percentage and increasing the final average salary by 1/3 of the load percentage.
 - c. Most significantly, the methodology used creates an inconsistency between the salary used in calculating the benefit and that assumed to be the basis for member contributions. We assume that the vacation time converted becomes pensionable pay and as such member contributions must be paid with respect to that amount. In determining member contribution rates, the present value of projected benefits is divided by the present value of pay that is subject to the



PART 2: REVIEW OF MEMBER CONTRIBUTION RATES RESULTS

member contributions (for example, pay after 30 years of service is excluded.) Cheiron's calculation of the present value of pay is not adjusted to include any vacation time. Therefore the member contribution rates calculated are spreading the cost of benefits including vacation time over pay that excludes vacation time. If all assumptions are met, the benefit will be fully paid before member contributions are applied to the vacation pay, and member contributions on vacation pay will result in more than the value of the benefit being funded.

d. While the impacts of these items are relatively small, we recommend Cheiron discuss this methodology with StanCERA before new member rates are determined.

Member COLA Rates

Unlike basic member contribution rates, the COLA rates are meant to finance one half of the actual cost of the COLA. Cheiron's methodology is to calculate the contribution rate based upon the present value of benefits and the present value of future salaries (modified to limit payments to 30 years) as determined by the actuarial valuation model for a hypothetical employee at each entry age in each Tier, except Tiers 3 and 6.

Under this methodology, if all actuarial assumptions are exactly met, during the period from Entry Age until retirement, each active employee will fund one half the value of the lifetime retiree COLA they will receive.

Comments

Bartel Associates was able to exactly replicate Cheiron's calculations upon consulting with Cheiron. Cheiron applied no service eligibility requirement for deferred terminated benefits for the purpose of calculating member COLA contribution rates. We recommend this be reviewed since 5 years of Credited Service are required for participants to retire with deferred vested benefits.

COLA Member contribution rates calculated using the 5 year service requirement are about 0.1% of pay higher for General Tier 2 and General Tier 5, less than .05% higher for Safety Tier 2 and generally less than .03% higher for Safety Tier 5.



PART 2: REVIEW OF MEMBER CONTRIBUTION RATES RESULTS

The following chart compares Bartel Associates' calculation of Member contribution rates for General Tier 5 members at three entry ages. The COLA rates shown reflect the application of the 5-year eligibility requirement for deferred vested benefits.

		Bartel As	ssociates		Ch	eiron Valu	ation Rep	ort	Ratio Bartel/Cheiron				
Entry	Basic First	Basic Over	COL First	COL Over	Basic First	Basic Over	COL First	COL Over	Basic First	Basic Over	COL First	COL Over	
Age	\$350	\$350	\$350	\$350	\$350	\$350	\$350	\$350	\$350	\$350	\$350	\$350	
20	4.09%	6.14%	1.27%	1.91%	4.09%	6.14%	1.21%	1.81%	100.0%	100.0%	105.0%	105.5%	
40	5.55%	8.32%	1.97%	2.97%	5.55%	8.32%	1.93%	2.89%	100.0%	100.0%	102.1%	102.8%	
54	6.55%	9.83%	2.06%	3.08%	6.55%	9.83%	2.03%	3.05%	100.0%	100.0%	101.5%	101.0%	

Overall Conclusion

We believe the member contribution rates determined by Cheiron are reasonable.





Purpose of the Actuarial Review

Bartel Associates has performed an actuarial review of StanCERA's July 1, 2012 through June 30, 2015 triennial experience study to provide assurance to the Association that the actuarial calculations, methods, considerations and analysis are reasonable and conform to Actuarial Standards of Practice.

Scope of the Actuarial Review

The scope our review includes the following:

- 1) Evaluation of the available data for the performance of such experience study, the degree to which such data is sufficient to support the conclusions of the study, and the use and appropriateness of any assumptions made regarding such data.
- 2) Evaluation of recommended economic and non-economic assumptions as presented in the experience study report.
- 3) Independent reproduction of the experience study without relying on Cheiron's work.
- 4) Evaluation of the study results and reconciliation of any discrepancies between the findings, assumptions, methodology, rates, and adjustments.

Methodology

Bartel Associates performed the following steps in connection with our review of the actuarial experience study.

- 1) We performed stochastic modeling to evaluate Cheiron's determination of the expected rate of return on assets and also to evaluate the discount rate we would recommend based on Bartel Associates' usual capital market assumptions.
- 2) Based on the historical data files provided by Cheiron, we replicated the demographic experience study and compared our replication to Cheiron's results.
- 3) For other assumptions, we reviewed Cheiron's report and used professional judgment to evaluate the methodologies, evaluation of data, and conclusions drawn.





The economic assumptions included in Cheiron's 7/1/2012 to 6/30/2015 actuarial experience study were:

- 1) Price inflation
- 2) COLA Growth
- 3) Across-the Board Pay Increases
- 4) Discount rate

Price Inflation:

In addition to providing a basis for valuing the System's Tier 1, 2, 4, 5 and 6 COLA increases, this assumption is a building block used in the construction of the Across-the Board Pay Increase and Discount Rate assumptions.

StanCERA's newly adopted assumption at the time of the experience study was 3.00%. We agree that this is a reasonable long-term assumption in view of factors such as historic experience (30-year average of 2.7%, 50-year average of 4.1%) and Social Security's long-term intermediate assumption of 2.6%. However there is clearly a trend towards lower inflation rates as evidenced by the trend of average rates of inflation in the last two current business cycles as shown below (per the 2016 social Security Trustee's Report).

Period	Average Rate of Inflation
1989-2000	2.96%
2000-2007	2.65%
2007-2015	1.68%

Taking into account the Federal Reserve's policy of inflation containment, it appears likely that at the next experience study a further reduction in the price inflation assumption should be considered.

COLA Growth

Cheiron used statistical simulations to estimate future COLA increases for participants of all Tiers other than Tier 3. Based on these simulations, they recommended a 2.7% increase assumption to project future COLA increases. We consider this a reasonable assumption taking into account considering that projected COLA bank balances will not always be sufficient to raise COLA increases to 3% in years when the increase in the CPI is below the 3% cap.



Across-the Board Pay Increases (Wage Inflation)

This assumption is generally based on the assumed inflation rate plus a component for pay increases in excess of inflation (i.e. increases in real wages). The assumption is used to project future payrolls for amortization of the Unfunded Actuarial Accrued Liability and is also used as a building block in determining future active member pay increases. The assumption recommended in the Cheiron report was the price inflation rate increased by 0.25%. Though somewhat on the low side in comparison to historic nationwide experience, this assumption falls within the reasonability range.

Discount Rate

This assumption is dependent on the assumed rate of inflation and the "real" rate of return on the various asset investment classes in the StanCERA fund. The assumption most recently adopted by the Board and recommended by Cheiron is 7.25% (which may be separated into a 3.00% inflation rate and a real rate of return for the portfolio of 4.25%).

Cheiron simulated returns for the StanCERA portfolio based on VERUS 10-year capital market assumptions and also based on a survey of investment consultant's 20-year capital market assumptions conducted by Horizon. We independently ran those simulations and agreed within a small margin of the results. Cheiron median return results are shown below:

	VERUS	Horizon	StanCERA
Inflation Assumption	2.10%	2.29%	3.00%
Real Rate of Return	<u>4.03%</u>	<u>5.03%</u>	<u>4.25%</u>
Median Discount Rate	6.13%	7.32%	7.25%

In addition we used our current capital market real rate of return assumptions, which are based on those of an average of four outside investment advisors, and StanCERA's 3.00% inflation assumption to generate median results (50% confidence that assumption will be met) and also 45% and 55% confidence results as illustrated below:





	45%	50%	55%
	Confidence	Confidence	Confidence
Real Rate of Return	4.92%	4.63%	4.29%
Investment Expenses	<u>-0.30%</u>	<u>-0.30%</u>	<u>-0.30%</u>
Net Real Rate of Return	4.62%	4.33%	3.99%
Inflation Assumption	<u>3.00%</u>	<u>3.00%</u>	<u>3.00%</u>
Discount Rate	7.62%	7.33%	6.99%
Discount Rate rounded	7.50%	7.25%	7.00%

The results confirm that the 7.25% is a reasonable assumption, but also that it contains only a small margin for conservatism. Taking into account the small margin and that there is a trend towards reductions in capital market assumptions among a number of investment consultants, we agree with Cheiron that it is likely that the discount rate will need to be reduced further in the future.

Excess Earnings Policy

We reviewed StanCERA's excess earnings policy and based on the system's funded level and the provisions of the policy it does not appear to be significant at this time. However we did not estimate potential costs of the policy and would recommend that its significance be reviewed by the system's actuary in the next valuation.





Actuarial Standard of Practice #35, "Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations" defines a reasonable assumption as one that:

- 1) Is appropriate for the purpose of the measurement;
- 2) Reflects the actuary's professional judgment;
- 3) Takes into account historical and current demographic data that is relevant as of the measurement date;
- 4) Reflects the actuary's estimate of future experience; and
- 5) Has no significant bias (i.e., it is not significantly optimistic or pessimistic).

The Standard also notes that, due to the inherent uncertainties in trying to predict the future, there is a range of possible reasonable assumptions and different actuaries may select different reasonable assumptions.

Our analysis focused on whether we believe the selected assumptions are reasonable and adequately supported by the data. However, we have several recommendations for improvements in subsequent studies.

Cheiron analyzed certain assumptions using aggregate data; Bartel Associates does not have data available to replicate these calculations. These assumptions include: active member mortality, reciprocity, retirement age for vested terminated members, and cashing out of unused vacation. Bartel Associates has reviewed the methodology and conclusions for these assumptions.

The demographic assumptions reviewed by Cheiron with recommended assumptions supported by detailed analysis of the past 3 years data are retiree mortality, termination, and disability and service retirement and merit salary increases. For these, Bartel Associates replicated the experience study performed by Cheiron. In general, our results are very close to Cheiron's although there are a few discrepancies we expect are due to records for transferred individuals.



Conclusion

Overall, we believe Cheiron's calculations are accurate and produced conclusions and recommended actuarial assumptions that are appropriate, supported by the data, and reasonable.

Comments

Following are selected charts showing a comparison of the raw rates produced by our studies.

Salary – Merit and longevity, comparison of raw annual increases for each year of service.



Termination of employment – comparison of raw annual increases for each year of service.







Service Retirement. We note the discrepancies apparent at later ages in the tables for members with longer years of service are due to the limited number of exposures at those ages, so that a difference in categorization of one member can have a visible impact on the rates.



Data Analysis

Cheiron has followed standard industry methodology by finding "A/E" ratios for each contingency. The number of occurrences actually ("A") found in the data is divided by the number expected ("E") or predicted by the assumptions. Ratios near 100% indicate the assumptions may be working well. However, this calculation considers only the total number of occurrences and not how they are distributed by age or service. That timing is very important to the liabilities produced by the valuation. Cheiron has added a second measure to their analysis: r-squared. This factor measures how similar two curves are. An r-squared of 1.0 means the curves are identical. We believe this adds an important element to the assumption selection. By selecting assumptions with r-squared closer to 1.0 and a better



A/E ratio, the Association can be comfortable that the new assumptions are a better fit to the data than the previous assumptions.

Following are our comments on some of the specific calculations and assumptions selected.

Merit pay increases

The merit salary increase rates calculated by Bartel Associates are somewhat higher than those calculated by Cheiron. This may be because we are not using the same aggregate average pay offset.

Cheiron's report states that rates of merit salary increase were calculated by subtracting the increase in the aggregate average wages for members with over 20 years of service from the actual increase. It would be helpful if the average aggregate pay increases were documented in the report, as well as the actual pay increases observed.

The resulting recommended merit increase rates average about 0% for employees with about 10 years of service and later. We expect that result based on the methodology used. Cheiron has recommended using a merit increase rate of $\frac{1}{2}$ % after 10 years of service. If one gives full weight to the observed data, this creates a bias toward the valuation projecting higher salaries and hence higher liabilities than are truly expected. Alternatively, it could be viewed as adding an element of conservatism to the recommended rates. We recommend Cheiron comment on their reason for selecting the minimum $\frac{1}{2}$ %.

Our results closely matched Cheiron's. We note an observable "bump" in merit pay at about 25 years of service for Safety employees and about 30 years for General. We expect this relates to a longevity increase. If that is the case, and that pay practice is expected to continue, we recommend considering an adjustment to the merit increase rates at 25 and 30 years to reflect this.

Disability

We note that the actual number of disablements experienced during the 6-year period encompassed by the last two experience studies is quite small: 15 service-related disablements for Safety members and 5 for General members, and 3 total non-service-related disabilities. Due to lack of experience, Cheiron has recommended using the tables CalPERS



has developed for non-service-related disability based on a much larger pool of data. We concur with this recommendation.

The source of the current disablement rates for service-related disablements is not discussed in the report. We recommend that be disclosed. In the next experience study, we would recommend including 9 years of disablement experience, both to provide more data points and to monitor experience for any trends.

Post-retirement Mortality

We concur with Cheiron's methodology, weighting the calculations by benefit amount and also adjusting the calculated rates for credibility. However, we note that the resulting A/E ratios are below Cheiron's 90% target for male retirees. The report says they are comfortable with this ratio since "the use of generational mortality assumptions will automatically result in mortality rates that decrease over time." We strongly believe generational mortality rates are meant to reflect future improvements in mortality, improvements that will be seen in future experience studies. Their purpose is not to gradually improve valuation mortality rates until they match the currently observed data.

Service Retirement

Cheiron's experience study recommends service retirement rates that differ for General and Safety classifications, and are also different for Safety and General employees over 20 and 30 years of service, respectively. We note that experience studies for other public agencies have documented retirement behavior that differs depending on benefit levels. Cheiron has not provided any evidence to show whether StanCERA's experience differs by benefit formula, or is similar enough to be grouped by classification.

Additionally, while no data exists yet for retirement experience among employees with the PEPRA benefit formula, most California retirement systems expect PEPRA members to delay their retirements due to the lower benefit levels provided. In addition to affecting the valuation results, Tier 6 retirement rates would impact the member contribution rates calculated for that Tier. We recommend Cheiron document their rationale or supporting data for use of retirement rates that do not differ by tier.



Vacation Cash-out

The data provided by Cheiron compares the average pay cashed out at retirement and the average final average pay for each retiring member. We would like to see this calculation documented separately for the tiers with 12-month and 36-month average pay benefit formulas. For example, we understand that the amount of vacation time that can be cashed out in any year is limited. It is possible that members with 36-month final average pay formulas choose to cash out vacation in each of their final 3 years rather than only in the final year.

We would expect to see a difference in the amount of vacation time cashed out depending on a member's service. Cheiron should be requested to provide this analysis.

Also, it appears that there is a disconnect between the way this factor was calculated in the experience study and its application in the valuation. Based on the description in the experience study, we expect that, on average, the vacation time cashed out at retirement is sufficient to increase the 36-month final average earnings by 3.5% for General members and 3.0% for Safety, resulting in a 3.5% or 3.0% increase in the member's benefit. However, in the actuarial valuation, that load is applied only to the final year's pay, meaning that the 36-month final average pay, and so the member's benefit, is increased by only 1/3 of the load amount.

Unused Sick Leave

We also note the plan provides that unused sick leave may be converted to service credit at retirement. We believe this option should be analyzed to determine whether its impact is significant enough to require a separate assumption.



	StanCERA Data Processed by Bartel Associates												
		COUNTY											
			Ger	ne ral				Safety					
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	PEPRA	Tiers 1 & 4	Tiers 2 & 5	PEPRA				
Active Participants													
Number	1	247	17	36	2,227	769	2	480	161				
Avg. Age	56.28	38.77	53.30	61.05	48.97	36.52	59.41	41.31	28.32				
Avg. Service	16.76	4.09	17.75	34.73	14.61	1.12	26.57	13.16	1.08				
Avg. Pay (no furloughs)	\$37,398	\$50,953	\$49,585	\$74,420	\$60,229	\$40,958	\$83,543	\$71,361	\$58,082				
Term Vested													
Number	17	66	22	1	272	-	-	64	-				
Avg. Age	62.25	55.99	54.93	65.69	47.39	n/a	n/a	43.26	n/a				
Avg. Service	10.71	8.85	12.15	5.55	10.03	n/a	n/a	10.07	n/a				
Trans fe rs													
Number	4	117	5	2	162	9	1	99	4				
Avg. Age	61.45	48.58	51.68	58.14	46.60	38.13	66.80	41.24	38.28				
Avg. Service	10.81	2.50	7.20	14.32	7.66	0.86	6.08	6.73	0.85				
Total Inactives													
Number	21	183	27	3	434	9	1	163	4				
Avg. Age	62.10	51.26	54.33	60.66	47.09	38.13	66.80	42.03	38.28				
Avg. Service	10.73	4.79	11.24	11.41	9.15	0.86	6.08	8.04	0.85				
					CERES	5							
			Ger	ne ral				Safety	<u>y</u>				
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	PEPRA	Tiers 1 & 4	Tiers 2 & 5	PEPRA				
Active Participants													
Number	-	4	-	2	90	28	-	72	8				
Avg. Age	n/a	44.00	n/a	61.31	48.40	37.30	n/a	38.95	30.13				
Avg. Service	n/a	9.56	n/a	41.13	14.66	1.14	n/a	11.96	0.68				
Avg. Pay (no furloughs)	n/a	\$48,811	n/a	\$62,454	\$68,685	\$42,926	n/a	\$84,530	\$58,082				
Term Vested													
Number	1	4	-	-	8	-	-	12	-				
Avg. Age	61.17	55.15	n/a	n/a	49.78	n/a	n/a	43.62	n/a				
Avg. Service	5.32	7.59	n/a	n/a	11.75	n/a	n/a	10.28	n/a				
Trans fe rs													
Number	-	5	-	-	14	-	-	17	-				
Avg. Age	n/a	50.22	n/a	n/a	44.49	n/a	n/a	43.20	n/a				
Avg. Service	n/a	2.19	n/a	n/a	10.78	n/a	n/a	7.33	n/a				
Total Inactives													
Number	1	9	-	-	22	-	-	29	-				
Avg. Age	61.17	52.41	n/a	n/a	46.41	n/a	n/a	43.37	n/a				
Avg. Service	5.32	4.59	n/a	n/a	11.13	n/a	n/a	8.55	n/a				



		Cherion Valuation Data										
					COUNT	Y						
			Gen	ne ral				Safety				
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	PEPRA	Tiers 1 & 4	Tiers 2 & 5	PEPRA			
Active Participants												
Number	1	247	17	36	2,227	769	2	480	161			
Avg. Age	56.00	38.73	53.24	61.00	48.95	36.49	59.50	41.27	28.32			
Avg. Service	16.76	4.09	17.75	34.73	14.61	1.12	26.57	13.16	1.08			
Avg. Pay (no furloughs)	\$37,398	\$50,552	\$49,340	\$74,329	\$59,919	\$40,768	\$83,543	\$71,433	\$50,826			
Term Vested												
Number	17	66	22	1	274	-	-	68	-			
Avg. Age	62.24	55.95	54.77	66.00	47.35	n/a	n/a	43.25	n/a			
Avg. Service	10.47	8.85	12.15	5.55	10.09	n/a	n/a	9.96	n/a			
Trans fe rs												
Number	4	118	13	2	193	12	1	114	6			
Avg. Age	61.75	48.61	50.54	58.00	45.49	35.08	67.00	40.27	34.67			
Avg. Service	10.81	2.49	15.86	14.33	7.89	1.04	6.08	6.97	1.17			
Total Inactives												
Number	21	184	35	3	467	12	1	182	6			
Avg. Age	62.14	51.24	53.20	60.67	46.58	35.08	67.00	41.38	34.67			
Avg. Service	10.53	4.77	13.53	11.41	9.18	1.04	6.08	8.09	1.17			
0					CERES							
			Gen	ne ral				Safety				
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	PEPRA	Tiers 1 & 4	Tiers 2 & 5	PEPRA			
Active Participants												
Number	-	4	-	2	90	28	-	72	8			
Avg. Age	n/a	44.00	n/a	61.00	48.40	37.32	n/a	38.89	30.25			
Avg. Service	n/a	9.56	n/a	41.13	14.66	1.14	n/a	11.96	0.68			
Avg. Pay (no furloughs)	n/a	\$48,436	n/a	\$62,454	\$68,978	\$42,695	n/a	\$84,047	\$59,711			
Term Vested												
Number	1	4	-	-	8	-	-	12	-			
Avg. Age	61.00	55.25	n/a	n/a	49.88	n/a	n/a	43.75	n/a			
Avg. Service	5.32	7.59	n/a	n/a	11.75	n/a	n/a	10.28	n/a			
Trans fe rs												
Number	-	5	-	-	19	1	-	18	-			
		50.00	n/a	n/a	41.79	33.00	n/a	43.28	n/a			
Avg. Age	n/a	30.00	11/4	10								
Avg. Age Avg. Service	n/a n/a	2.19	n/a	n/a	10.16	0.55	n/a	7.70	n/a			
Avg. Age Avg. Service Total Inactives	n/a n/a	2.19	n/a	n/a	10.16	0.55	n/a	7.70	n/a			
Avg. Age Avg. Service Total Inactives Number	n/a 1	2.19 9	n/a	n/a	10.16	0.55	n/a	7.70	<u>n/a</u>			
Avg. Age Avg. Service Total Inactives Number Avg. Age	n/a n/a 1 61.00	2.19 9 52.33	n/a 	n/a - n/a	10.16 27 44.19	0.55 1 33.00	n/a - n/a	7.70 30 43.47	n/a - n/a			



		Ratio Bartel/Cheiron											
					COUNT	Y							
			Ger	ne ral		[Safety					
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	PEPRA	Tiers 1 & 4	Tiers 2 & 5	PEPRA				
Active Participants													
Number	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Age	101%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Service	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Pay (no furloughs)	100%	101%	100%	100%	101%	100%	100%	100%	114%				
Term Vested													
Number	100%	100%	100%	100%	99%	100%	100%	94%	100%				
Avg. Age	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Service	102%	100%	100%	100%	99%	100%	100%	101%	100%				
Trans fe rs													
Number	100%	99%	38%	100%	84%	75%	100%	87%	67%				
Avg. Age	100%	100%	102%	100%	102%	109%	100%	102%	110%				
Avg. Service	100%	101%	45%	100%	97%	83%	100%	97%	73%				
Total Inactives													
Number	100%	99%	77%	100%	93%	75%	100%	90%	67%				
Avg. Age	100%	100%	102%	100%	101%	109%	100%	102%	110%				
Avg. Service	102%	100%	83%	100%	100%	83%	100%	99%	73%				
0					CERES								
			Ger	neral				Safety					
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	PEPRA	iers 1 &	iers 2 &	PEPRA				
Active Participants													
Number	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Age	100%	100%	100%	101%	100%	100%	100%	100%	100%				
Avg. Service	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Pay (no furloughs)	100%	101%	100%	100%	100%	101%	100%	101%	97%				
Term Vested													
Number	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Age	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Avg. Service	100%	100%	100%	100%	100%	100%	100%	100%	100%				
Trans fe rs													
Number	100%	100%	100%	100%	74%	0%	100%	94%	100%				
Avg. Age	100%	100%	100%	100%	106%	100%	100%	100%	100%				
Avg. Service	100%	100%	100%	100%	106%	100%	100%	95%	100%				
Total Inactives													
Number	100%	100%	100%	100%	81%	0%	100%	97%	100%				
Avg Age	100%	100%	100%	100%	105%	100%	100%	100%	100%				



			•	StanCEF	RA Data P	rocessed	by Bartel	Associat	e s				
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	26	9	-	-	-	-	-	-	-	-	-	-	35
25-29	94	66	26	23	2	14	1	-	-	-	-	-	226
30-34	80	76	49	43	4	95	20	-	-	-	-	-	367
35-39	72	47	31	31	-	135	115	29	-	-	-	-	460
40-44	42	42	19	21	9	109	125	79	11	-	-	-	457
45-49	29	20	14	17	6	94	105	121	49	11	-	-	466
50-54	32	22	14	6	3	71	97	121	68	54	7	-	495
55-59	10	9	10	10	2	60	103	94	57	45	16	8	424
60-64	3	6	1	7	3	50	60	56	38	28	7	16	275
65-69	1	-	2	-	-	13	26	15	13	8	3	3	84
70+	-	-	-	-	-	1	3	3	1	-	-	-	8
Total Count	389	297	166	158	29	642	655	518	237	146	33	27	3,297
					Cheir	on Valuat	ion Data						
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	26	9	-	-	-	-	-	-	-	-	-	-	35
25-29	96	64	26	23	3	13	1		-	-	-	-	226
30-34	80	77	48	43	6	93	20	-	-	-	-	-	367
35-39	75	48	31	32	-	136	115	28		-	-	-	465
40-44	42	40	19	21	10	111	122	78	11	-	-	-	454
45-49	28	21	14	17	6	95	106	119	49	11	-	-	466
50-54	32	22	14	6	3	72	97	122	68	54	7	-	497
55-59	10	9	10	10	2	63	103	94	55	44	16	8	424
60-64	3	6	1	7	3	48	59	57	38	28	7	16	273
65-69	1	-	2	-	-	13	26	14	13	8	2	3	82
70+	-	-	-	-	-	1	3	3	1	-	-	-	8
Total Count	393	296	165	159	33	645	652	515	235	145	32	27	3,297
					Rati	o Bartel/C	heiron						
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
20-24	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25-29	98%	103%	100%	100%	67%	108%	100%	100%	100%	100%	100%	100%	100%
30-34	100%	99%	102%	100%	67%	102%	100%	100%	100%	100%	100%	100%	100%
35-39	96%	98%	100%	97%	100%	99%	100%	104%	100%	100%	100%	100%	99%
40-44	100%	105%	100%	100%	90%	98%	102%	101%	100%	100%	100%	100%	101%
45-49	104%	95%	100%	100%	100%	99%	99%	102%	100%	100%	100%	100%	100%
50-54	100%	100%	100%	100%	100%	99%	100%	99%	100%	100%	100%	100%	100%
55-59	100%	100%	100%	100%	100%	95%	100%	100%	104%	102%	100%	100%	100%
60-64	100%	100%	100%	100%	100%	104%	102%	98%	100%	100%	100%	100%	101%
65-69	100%	100%	100%	100%	100%	100%	100%	107%	100%	100%	150%	100%	102%
70+	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Count	99%	100%	101%	99%	88%	100%	100%	101%	101%	101%	103%	100%	100%

Age & Service Distribution of Active Members by Count as of June 30, 2015 General Members (County)





	-			StanCEF	RA Data P	rocessed	by Bartel	Associat	es				
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	2	2	-	-	-	-	-	-	-	-	-	-	4
25-29	5	1	1	-	-	-	-	-	-	-	-	-	7
30-34	2	1	3	4	-	4	-	-	-	-	-	-	14
35-39	1	2	1	-	-	2	7	1	-	-	-	-	14
40-44	1	-	-	2	-	5	5	1	1	-	-	-	15
45-49	2	-	1	-	-	5	4	2	1	2	-	-	17
50-54	1	-	-	-	2	4	3	4	3	2	-	1	20
55-59	1	1	-	-	-	3	3	5	2	2	-	-	17
60-64	-	2	1	-	-	1	1	-	2	1	2	-	10
65-69	-	-	-	-	-	3	1	-	-	-	-	1	5
70+	-	-	-	-	-	1	-	-	-		-	-	1
Total Count	15	9	7	6	2	28	24	13	9	7	2	2	124
					Cheir	on Valuat	ion Data						
	-		_	-	-	Year	s of Servic	e					_
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	2	2	-	-	-	-	-	-	-	-	-	-	4
25-29	5	1	1	-	-	-	-	-	-	-	-	-	7
30-34	2	1	3	4		4	-	-	-	-	-	-	14
35-39	1	2	1	-	-	2	7	1	-	-	-	-	14
40-44	1	-	-	2	-	5	5	1	1	-	-	-	15
45-49	2	-	1	-	-	5	4	2	1	2	-	-	17
50-54	1	-	-	-	2	4	3	4	3	2	-	1	20
55-59	1	1	-	-	-	4	3	4	2	2	-	-	17
60-64	-	2	1	-	-	1	1	-	2	1	2	-	10
65-69	-	-	-	-	-	3	1	-	-	-	-	1	5
70+	-	-	-	-	-	1	-	-	-	-	-	-	1
Total Count	15	9	7	6	2	29	24	12	9	7	2	2	124
					Ratio	Bartel/C	heiron						
		· .				Year	s of Servic	e	20.24	25.20	20.24	25.	m , 1
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
20-24	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25-29	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30-34	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
35-39	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
40-44	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
45-49	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
50-54	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
55-59	100%	100%	100%	100%	100%	75%	100%	125%	100%	100%	100%	100%	100%
60-64	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
65-69	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
70+	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Count	100%	100%	100%	100%	100%	97%	100%	108%	100%	100%	100%	100%	100%

Age & Service Distribution of Active Members by Count as of June 30, 2015 General Members (Ceres)





				StanCEF	RA Data Pi	rocessed	by Bartel	Associat	e s				
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	24	8	5	-	-	-	-	-	-	-	-	-	37
25-29	36	27	21	10	-	6	-	-	-	-	-	-	100
30-34	18	6	8	10	1	62	17	-	-	-	-	-	122
35-39	7	5	6	1	-	24	56	9	-	-	-	-	108
40-44	2	1	-	1	-	20	31	45	8	-	-	-	108
45-49	-	-	1	-	1	5	18	30	26	4	-	-	85
50-54	2	1	2	-	-	6	10	7	15	8	-	-	51
55-59	-	-	2	-	-	3	7	1	3	3	1	1	21
60-64	-	-	-	-	-	2	1	5	1	-	-		9
65-69	-	-	1	-	-	1	-	-	-	-	-	-	2
70+	-	-	-	-	-	-	-	-	-		-	-	0
Total Count	89	48	46	22	2	129	140	97	53	15	1	1	643
Cheiron Valuation Data Vears of Service													
1 00	0	1	2	2	4	Year	s of Servic	15 10	20.24	25.20	20.24	25.	T-/ 1
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
0 nder 20	-	-	-	-	-	-	-			-	-	-	27
20-24	24	0 25	20	- 10		-	-	-	-	-	-	-	100
23-29	39 19	23	20	10	-	6	-	-	· · ·	-	-	-	100
30-34	18	0	8	12	2	00	10	-		-	-	-	122
35-39	2	0	/	1	1	21	20	11	-	-	-	-	111
40-44	2	1	-	1	-	21	19	43	0	-	-	-	105
43-49	1	-	1	-	1	5	18	30	20	4	-	-	80 50
55 50	2	1	2	-	-	2	9	1	15	0	-	-	21
55-59 60.64	-	-	2	-	-	3	1	1	1	3	1	1	21
65 60	-	-	1	-	-	2	1	5	1	-	-	-	2
03-09 70+	-	-			-	1	-	-	-	-	-	-	2
70+ Total Count	- 02	-	-	- 24	-	125	127	- 07	52	- 15	- 1	- 1	643
Total Coult	93	4/	40	24	+ Dotic	Dortol/C	'hoiron	71	55	15	1	1	043
					Natio	Vear	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
20-24	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25-29	92%	108%	105%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30-34	100%	100%	100%	83%	50%	103%	106%	100%	100%	100%	100%	100%	100%
35-39	100%	83%	86%	100%	0%	114%	98%	82%	100%	100%	100%	100%	97%
40-44	100%	100%	100%	100%	100%	95%	107%	105%	100%	100%	100%	100%	103%
45-49	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%
50-54	100%	100%	100%	100%	100%	100%	111%	100%	100%	100%	100%	100%	102%
55-54	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
60-64	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
65-69	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
70+	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Count	96%	102%	100%	92%	50%	103%	102%	100%	100%	100%	100%	100%	100%

Age & Service Distribution of Active Members by Count as of June 30, 2015 Safety Members (County)





		•		StanCEF	RA Data P	rocessed	by Bartel	Associat	es				
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	2	-	1	-	-	-	-	-	-	-	-	-	3
25-29	2	2	3	1	-	2	-	-	-	-	-	-	10
30-34	1	1	2	-	1	9	4	-	-	-	-	-	18
35-39	-	-	-	-	-	5	3	4	-	-	-	-	12
40-44	1	-	-	1	-	4	6	5	1	-	-	-	18
45-49	1	-	-	-	-	2	2	3	3	1	-	-	12
50-54	1	-	-	-	-	-	-	2	1	-	-	-	4
55-59	-	-	-	-	-	-	-	-	-	1	1	-	2
60-64	-	-	-	-	-	1	-	-	-	-	-	-	1
65-69	-	-	-	-	-	-	-	-	-	-	-		0
70+	-	-	-	-	-	-	-	-	-		-	-	0
Total Count	8	3	6	2	1	23	15	14	5	2	1	0	80
					Cheir	on Valuat	ion Data						
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	-	-	-	-	-	-	-	-	-	-	-	-	0
20-24	2	-	1	-	-	-	-	-	-	-	-	-	3
25-29	2	2	3	1	-	2	-	-	-	-	-	-	10
30-34	1	1	2	-	2	9	3	-	-	-	-	-	18
35-39	-	-	-	-	1	5	2	4		-	-	-	12
40-44	1	-	-	1	-	4	6	5	1	-	-	-	18
45-49	1	-	-	-		2	2	3	3	1	-	-	12
50-54	1	-	-	-	-	-	-	2	1	-	-	-	4
55-59	-	-	-	-	-	-	-	-	-	1	1	-	2
60-64	-	-	-	-	-	1	-	-	-	-	-	-	1
65-69	-	-	-	-	-	-	-	-	-	-	-	-	0
70+	-	-	-	-	-	-	-	-	-	-	-	-	0
Total Count	8	3	6	2	3	23	13	14	5	2	1	0	80
					Ratio	o Bartel/C	Cheiron						
						Year	s of Servic	e					
Age	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Total
Under 20	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
20-24	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25-29	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30-34	100%	100%	100%	100%	50%	100%	133%	100%	100%	100%	100%	100%	100%
35-39	100%	100%	100%	100%	0%	100%	150%	100%	100%	100%	100%	100%	100%
40-44	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
45-49	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
50-54	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
55-59	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
60-64	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
65-69	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
70+	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Count	100%	100%	100%	100%	33%	100%	115%	100%	100%	100%	100%	100%	100%

Age & Service Distribution of Active Members by Count as of June 30, 2015 Safety Members (Ceres)





APPENDIX B DETAIL OF SAMPLE LIVES

			Bartel Associates		Cheiro	n Valuation	Report	Ratio	Bartel/Ch	eiron			
Sample	Status	General/ Safety	Tier	Present Value of Future Benefits	Actuarial Liability	Valuation Pay	Present Value of Future Benefits	Actuarial Liability	Valuation Pay	Present Value of Future Benefits	Actuarial Liability	Valuation Pay	Comments
1			3	23,379	15,133	34,230	9,635	6,026	34,230	242.6%	251.1%	100.0%	Cheiron did not apply ERF to Social Security offset
2		General	4	585,764	570,676	40,948	566,012	551,902	40,948	103.5%	103.4%	100.0%	Cheiron's benefits limited by FAP without vacation load
3	Active	General	5	587,902	391,059	97,856	585,129	391,642	97,856	100.5%	99.9%	100.0%	
4			6	148,014	17,415	105,061	144,318	17,280	105,061	102.6%	100.8%	100.0%	
5		Safety	5	367,825	108,359	68,098	362,708	107,485	68,098	101.4%	100.8%	100.0%	
6	Disability	General	1	860,196	860,196	-	860,196	860,196	-	100.0%	100.0%	n/a	
7	Disability	General	2	173,636	173,636	-	173,636	173,636	-	100.0%	100.0%	n/a	
8	Samina	General	5	650,602	650,602	-	650,602	650,602	-	100.0%	100.0%	n/a	
9	Retirement	Safety	4	592,063	592,063	-	592,063	592,063	-	100.0%	100.0%	n/a	
10	Retirement	Safety	5	430,381	430,381	-	430,381	430,381	-	100.0%	100.0%	n/a	
11			3	13,459	13,459	-	17,901	17,901	-	75.2%	75.2%	n/a	Cheiron applied COLA and 60% survivor continuance
12		General	5	25,941	25,941	-	25,941	25,941	-	100.0%	100.0%	n/a	
13		General 5		443,049	443,049	-	443,049	443,049	-	100.0%	100.0%	n/a	
14	Terminated		5	99,326	99,326	-	99,326	99,326	-	100.0%	100.0%	n/a	
15			2	441,488	441,488	-	441,488	441,488	-	100.0%	100.0%	n/a	
16		Safety	5	159,288	159,288	-	159,288	159,288	-	100.0%	100.0%	n/a	
17			5	287,394	287,394	-	287,394	287,394	-	100.0%	100.0%	n/a	



APPENDIX C DETAIL OF UAAL ALLOCATION (Amounts in \$000's)

Bartel Associates											
		County			Ceres		Total				
	General	Safety	Total	General	Safe ty	Total	Total				
Actuarial Value of Assets							1,763,629				
Accumulated Employee Contributions			183,725			12,349	196,074				
Inactive Actuarial Liability							1,453,058				
Net Assets for Distribution							114,497				
Active Actuarial Liability			893,220			60,559	953,779				
Allocation of Remaining Assets			93.65%			6.35%	100.00%				
Remaining Assets			107,227			7,270	114,497				
Total Assets			290,952			19,619	310,571				
Active Funded Ratio			32.57%			32.40%	32.56%				
Unfunded Actuarial Liability			602,268			40,940	643,208				
Total Actuarial Liability	1,724,576	570,621	2,295,197	54,510	57,130	111,640	2,406,837				
Allocation of Unfunded Actuarial Liability	75.14%	24.86%	100.00%	48.83%	51.17%	100.00%					
Unfunded Actuarial Liability	452,535	149,733	602,268	19,989	20,950	40,940	643,208				
UAL Amortization	31,788	10,518	42,306	1,404	1,472	2,876	45,182				
UAL Amortization Rate	16.75%	23.39%	18.02%	17.34%	21.46%	19.22%	18.09%				
	Cheiro	n Valuation	Report								
		County			Ceres		Tatal				
	General	Safety	Total	General	Safety	Total	Total				
Actuarial Value of Assets											
Accumulated Employee Contributions			183,725			12,349	196,074				
Inactive Actuarial Liability							1,452,214				
Net Assets for Distribution							115,341				
Active Actuarial Liability			879,305			60,003	939,308				
Allocation of Remaining Assets			93.61%			6.39%	100.00%				
Remaining Assets			107,973			7,368	115,341				
Total Assets			291,698			19,717	311,415				
Active Funded Ratio			33.17%			32.86%	33.15%				
Unfunded Actuarial Liability			587,607			40,286	627,893				
Total Actuarial Liability	1 713 558	567.116	2 280 674	54 006	56 842	110 848	2 391 522				
Allocation of Unfunded Actuarial Liability	75 13%	24 87%	100 00%	48 72%	51 28%	100.00%	2,371,322				
Unfunded Actuarial Liability	441 492	146 115	587 607	19.628	20.658	40 286	627 893				
UAL Amortization	31.012	10 264	41 276	1 379	1 4 5 1	2 830	44 106				
UAL Amortization Rate	16 34%	22 82%	17 58%	17 02%	21 16%	18 92%	17 66%				
	Ratio	Bartel/Ch	eiron	17.0270	21.10/0	10.9270	17.0070				
		County			Ceres						
	General	Safety	Total	General	Safe ty	Total	lotal				
Actuarial Value of Assets							100.0%				
Accumulated Employee Contributions			100.0%			100.0%	100.0%				
Inactive Actuarial Liability							100.1%				
Net Assets for Distribution							99.3%				
Active Actuarial Liability			101.6%			100.9%	101.5%				
Allocation of Remaining Assets			100.0%			99.4%	100.0%				
Remaining Assets			99.3%			98.7%	99.3%				
Total Assets			99.7%			99.5%	99.7%				
Active Funded Ratio			98.2%			98.6%	98.2%				
Unfunded Actuarial Liability			102.5%			101.6%	102.4%				
Total Actuarial Liability	100.6%	100.6%	100.6%	100.9%	100.5%	100.7%	100.6%				
Allocation of Unfunded Actuarial Liability	100.0%	100.0%	100.0%	100.2%	99.8%	100.0%					
Unfunded Actuarial Liability	102.5%	102.5%	102.5%	101.8%	101.4%	101.6%	102.4%				
UAL Amortization	102.5%	102.5%	102.5%	101.8%	101.4%	101.6%	102.4%				
UAL Amortization Rate	102.5%	102.5%	102.5%	101.8%	101.4%	101.6%	102.4%				





APPENDIX D DETAIL OF ACTUARIAL LIABILITIES BY TIER

(Amounts in \$000's)

Bartel Associates												
			Gen	e ral				Safety				
	Tiers 1 & 2	Tier 3	Tier 4	Tier 5	Tier 6	Total	Tiers 1 & 2	Tier 4	Tier 5	Tier 6	Total	Total
Present Value of Future Benefits												
Actives	29,962	1,161	33,659	872,614	56,812	994,208	10,427	2,080	318,866	27,562	358,935	1,353,143
Terminated Vested	11,025	624	1,147	65,591	198	78,585	3,769	-	31,805	90	35,664	114,249
Retirees	187,358	1,130	295,110	395,692	-	879,290	53,392	77,457	119,802	-	250,651	1,129,941
Disabled	32,289	9	1,449	16,856	-	50,602	34,593	5,492	33,342	-	73,427	124,029
Beneficiaries	31,394	83	10,205	13,813	-	55,495	22,543	3,024	3,777	-	29,344	84,839
Total	292,027	3,006	341,570	1,364,566	57,011	2,058,180	124,724	88,053	507,593	27,651	748,021	2,806,201
Actuarial Liability									4			
Actives	8,129	990	32,344	667,488	6,163	715,114	2,242	1,979	232,177	2,267	238,665	953,779
Terminated Vested	11,025	624	1,147	65,591	198	78,585	3,769	-	31,805	90	35,664	114,249
Retirees	187,358	1,130	295,110	395,692	-	879,290	53,392	77,457	119,802		250,651	1,129,941
Disabled	32,289	9	1,449	16,856	-	50,602	34,593	5,492	33,342	-	73,427	124,029
Beneficiaries	31,394	83	10,205	13,813	-	55,495	22,543	3,024	3,777	-	29,344	84,839
Total	270,193	2,835	340,256	1,159,441	6,361	1,779,086	116,539	87,952	420,904	2,356	627,751	2,406,837
Total Normal Cost	2,214	27	440	28,279	5,136	36,095	886	50	12,058	2,306	15,299	51,395

Cheiron Valuation Report												
			Gen	e ral					Safety			
	Tiers 1 & 2	Tier 3	Tier 4	Tier 5	Tier 6	Total	Tiers 1 & 2	Tier 4	Tier 5	Tier 6	Total	Total
Present Value of Future Benefits												
Actives	29,594	1,110	32,786	859,435	56,555	979,480	10,341	2,024	314,774	27,158	354,297	1,333,777
Terminated Vested	11,017	816	1,147	65,591	198	78,769	3,769	-	31,805	90	35,664	114,433
Retirees	187,355	1,411	294,811	394,904	-	878481	53,392	77,457	119,603	-	250,453	1,128,934
Disabled	32,286	11	1,449	16,853	-	50,599	34,593	5,492	33,342	-	73,427	124,026
Beneficiaries	31,391	109	10,205	13,793	-	55,499	22,543	3,024	3,756	-	29,322	84,821
Total	291,643	3,456	340,398	1,350,578	56,753	2,042,828	124,639	87,997	503,280	27,247	743,163	2,785,991
Actuarial Liability												
Actives	8,194	961	31,513	657,418	6,130	704,216	2,303	1,921	228,667	2,201	235,092	939,308
Terminated Vested	11,017	816	1,147	65,591	198	78,769	3,769	-	31,805	90	35,664	114,433
Retirees	187,355	1,411	294,811	394,904	-	878481	53,392	77,457	119,603	-	250,453	1,128,934
Disabled	32,286	11	1,449	16,853	-	50,599	34,593	5,492	33,342	-	73,427	124,026
Beneficiaries	31,391	109	10,205	13,793	-	55,499	22,543	3,024	3,756	-	29,322	84,821
Total	270,243	3,308	339,125	1,148,560	6,328	1,767,564	116,600	87,894	417,174	2,291	623,958	2,391,522
Total Normal Cost	2,170	26	425	27,888	5,120	35,629	875	52	12,051	2,263	15,241	50,870

Ratio Bartel/Cheiron												
			Gen	ıe ral					Safe ty			1
	Tiers 1 & 2	Tier 3	Tier 4	Tier 5	Tier 6	Total	Tiers 1 & 2	Tier 4	Tier 5	Tier 6	Total	Total
Present Value of Future Benefits				[]				ii		í – – – – – – – – – – – – – – – – – – –		i
Actives	101.2%	104.6%	102.7%	101.5%	100.5%	101.5%	100.8%	102.8%	101.3%	101.5%	101.3%	101.5%
Terminated Vested	100.1%	76.5%	100.0%	100.0%	100.0%	99.8%	100.0%	N/A	100.0%	100.0%	100.0%	99.8%
Retirees	100.0%	80.1%	100.1%	100.2%	N/A	100.1%	100.0%	100.0%	100.2%	N/A	100.1%	100.1%
Disabled	100.0%	81.8%	100.0%	100.0%	N/A	100.0%	100.0%	100.0%	100.0%	N/A	100.0%	100.0%
Beneficiaries	100.0%	76.1%	100.0%	100.1%	N/A	100.0%	100.0%	100.0%	100.6%	N/A	100.1%	100.0%
Total	100.1%	87.0%	100.3%	101.0%	100.5%	100.8%	100.1%	100.1%	100.9%	101.5%	100.7%	100.7%
Actuarial Liability			,,					,ı	,,			1
Actives	99.2%	103.0%	102.6%	101.5%	100.5%	101.5%	97.4%	103.0%	101.5%	103.0%	101.5%	101.5%
Terminated Vested	100.1%	76.5%	100.0%	100.0%	100.0%	99.8%	100.0%	N/A	100.0%	100.0%	100.0%	99.8%
Retirees	100.0%	80.1%	100.1%	100.2%	N/A	100.1%	100.0%	100.0%	100.2%	N/A	100.1%	100.1%
Disabled	100.0%	81.8%	100.0%	100.0%	N/A	100.0%	100.0%	100.0%	100.0%	N/A	100.0%	100.0%
Beneficiaries	100.0%	76.1%	100.0%	100.1%	N/A	100.0%	100.0%	100.0%	100.6%	N/A	100.1%	100.0%
Total	100.0%	85.7%	100.3%	100.9%	100.5%	100.7%	99.9%	100.1%	100.9%	102.9%	100.6%	100.6%
Total Normal Cost	102.0%	103.8%	103.5%	101.4%	100.3%	101.3%	101.3%	97.6%	100.1%	101.9%	100.4%	101.0%







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February 28, 2017

Retirement Board Agenda Item

- TO: Retirement Board
- FROM: Rick Santos, Executive Director
 - I. SUBJECT: 2016 Preliminary Actuarial Valuation Results
 - II. ITEM NUMBER: 6.b.
- III. ITEM TYPE: Discussion and Action
- IV. STAFF RECOMMENDATION: None
- V. ANALYSIS: Attachment 1 contains the June 30, 2016 Preliminary Actuarial Valuation results. The 2016 actuarial valuation sets employer and employee contribution rates for fiscal year 2017-2018. Preliminary results show the actuarial funded ratio decreased from 73.7% to 72.8% and the unfunded liability increased by about \$63 million to \$691 million. This appears to be mainly attributable to the 2015-2016 investment losses and average salaries and COLA's being higher than expected. The actual contribution rate increase was somewhat offset by the decrease in normal cost due to a faster than expected migration of newly hired employees into the PEPRA tier.
- VI. RISK: None
- VII. STRATEGIC PLAN: Strategic Objective IV: Refine StanCERA's business and policy practices in ways that enhance stakeholder awareness, the delivery of member services and the ability of the Organization to administer the System effectively and efficiently.
- VIII. ADMINISTRATIVE BUDGET IMPACT: None

Rick Santos, Executive Director

Stanislaus County Employees' Retirement System



Classic Values, Innovative Advice

2016 Preliminary Valuation Results

February 28, 2017

Graham A. Schmidt, ASA, EA, FCA Jonathan Chipko, FSA, EA, FCA Preliminary 2016 Valuation Results

- Executive Summary and Highlights
- Changes Since Last Valuation
- > Historical Review
- Next Steps
- > Appendix



February 28, 2017

Executive Summary



Stanislaus County Employees' Retirement Association								
Summary of Key Valuation Results								
(in millions)								

Valuation Date	Jun	e 30, 2015	June 30, 2016		
Fiscal Year End		2017	2018		
Actuarial Liability	\$	2,391.5	\$	2,537.1	
Actuarial Value of Assets*		1,763.6		1,845.8	
Unfunded Actuarial Liability (Actuarial Value)	\$	627.9	\$	691.3	
Funding Ratio (Actuarial Value)		73.7%		72.8%	
Market Value of Assets		1,812.6		1,752.7	
Unfunded Liability (Market Value)	\$	578.9	\$	784.4	
Funding Ratio (Market Value)*		75.8%		69.1%	
Net Employer Full Contribution Rate		30.86%		31.94%	
Net Employer Contribution Rate with Phase-In		24.99%		29.00%	

* Net of non-valuation reserves



February 28, 2017

Highlights



- Investment return on the market value of assets was -1.7%, net of investment expenses, compared to the 7.25% assumed rate of return.
- The actuarial return on assets was 6.3%, which resulted in a \$16.3 million loss and increased the contribution rate by 0.46% of pay. There are approximately \$93 million in deferred asset losses not yet recognized in the smoothed asset value.
- The FY15-16 actuarial cost exceeded the actual contribution by \$17.7M (due to oneyear lag), increasing the contribution rate by 0.52% of pay.
- Changes to the actuarial software programing recommended as part of the recent actuarial audit performed by Bartel increased contribution rate by 0.03% of pay.
- The net impact of all other changes, including salary and demographic changes, increased the contribution rate by 0.07% of pay.
 - Largest losses from salary increases and COLA increases higher than expected
 - Offset by reduction in employer normal cost rate of ~0.25%, due to movement of new hires into PEPRA tiers
- The amortization period for the UAL has dropped to 20 years. The Plan no longer experiences "negative amortization" (i.e. the payment on the unfunded is more than the interest on the UAL). This means that the UAL is expected to decrease each year if all assumptions are realized.



February 28, 2017
Changes Since Last Valuation

Classic Values, Innovative Advice

6

Stanislaus County Employees' Retirement Association Employer Contribution Reconciliation

(in millions)

	Total	Normal Cost	Amortization	Admin Exp
FYE 2017 Net Employer Contribution Rate - Full	30.86%	12.24%	17.66%	0.96%
Change Due to Asset Loss	0.46%	0.00%	0.46%	0.00%
Change Due to Contribution Shortfall	0.52%	0.00%	0.52%	0.00%
Change Due to Demographic Changes	0.50%	-0.29%	0.79%	0.00%
Change Due to Effect of Payroll on Amortization	-0.43%	0.00%	-0.41%	-0.02%
Change Due to Audit Updates	0.03%	0.01%	0.02%	0.00%
FYE 2018 Net Employer Contribution Rate - Full	31.94%	11.96%	19.04%	0.94%
Phase-in	-2.94%	-0.43%	-2.47%	-0.03%
FYE 2018 Net Employer Contribution Rate - Phased	29.00%	11.53%	16.57%	0.91%



Historical Review





Historical Review





Historical Review







- Finalize Actuarial Valuation results
 - Results shown are preliminary. Still proceeding with peer review.
- Adopt June 30, 2016 Actuarial Valuation and FY17-18 Contribution Rates





Stanislaus County Employees' Retirement Association Membership Total					
	J	une 30, 2015	J	une 30, 2016	% Change
Actives		4,144		4,248	2.51%
Current Inactives		979		1,030	5.21%
In-Pay Members		3,539		3,651	3.16%
Total Members		8,662		8,929	3.08%
Active Member Payroll (FYE 2016/2017)	\$	249,704,758	\$	263,395,718	5.48%
Average Pay per Active	\$	60,257	\$	62,005	2.90%





Stanislaus County Employees' Retirement Association Contributions					
	FYE 2017	FYE 2018	Change		
Gross Normal Cost %	22.17%	21.82%	-0.35%		
Employee Contributions	9.92%	9.85%	-0.07%		
Employer Normal Cost %	12.24%	11.96%	-0.28%		
Administrative Expense %	0.96%	0.94%	-0.02%		
Amortization of UAL %	17.66%	19.04%	1.38%		
Impact of Phase-in	-5.87%	-2.94%	2.93%		
Net Employer Phased Contribution Rate:	24.99%	29.00%	4.01%		



The purpose of this presentation is to present the preliminary annual actuarial valuation results of the Stanislaus County Employees' Retirement Association. This presentation is for the use of the Stanislaus County Employees' Retirement Board in accordance with applicable law.

In preparing our presentation, we relied on information (some oral and some written) supplied by the Stanislaus County Employees' Association. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice #23.

We hereby certify that, to the best of our knowledge, this presentation and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this presentation. This presentation does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This presentation was prepared exclusively for the Stanislaus County Employees' Retirement Board for the purpose described herein. This presentation is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

The actuarial assumptions, data and methods are those that will be used in the preparation of the actuarial valuation report as of June 30, 2016.

The assumptions reflect our understanding of the likely future experience of the Plans, and the assumptions as a whole represent our best estimate for the future experience of the Plans. The results of this presentation are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the true cost of the plan could vary from our results.

Graham A. Schmidt ASA, FCA Consulting Actuary Jonathan Chipko, FSA, EA, FCA Consulting Actuary

February 28, 2017



Classic Values, Innovative Advice



 Accomplishments: (contd.) Continued discussions related to testing procedures and tracking. Reviewed Tegrit meeting minutes, decision logs, and action items, as needed. Compiled project decisions and action items generated during meetings for tracking purposes. Collected and catalogued initial calculation examples. Continued work on the project timeline graphic. 		 other meetings scheduled each week. Upcoming: (contd.) Continue to review Tegrit meeting minutes, decision logs, and action items, as needed. Continue to compile and track decisions and action items generated during meetings. Assist StanCERA, as needed, with executing their plan to manifest paper files for back file conversion and other back file preparation tasks. Initiate the development and tracking of test cases/scripts.
Overs Requi Desig Opera Testir	sight Project Management Support irrements Confirmation in Participation ational Process Development ng	

Legato

Cumulative Value Added 1/1/2010 thru 12/31/2016



Jackson Square

Cumulative Value Added 1/1/2010 thru 12/31/2016





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February 28, 2017

Retirement Board Agenda Item

TO: Retirement Board

FROM: Rick Santos, Executive Director

- I. SUBJECT: StanCERA Schedule of Directives; Directives #2 and #3
- II. ITEM NUMBER: 8.a
- III. ITEM TYPE: Discussion and Action
- IV. STAFF RECOMMENDATION: Approve Directives 2 and 3
- V. ANALYSIS:

Schedule of Directives

The Schedule of Directives document contain certain policies that can change in the future based on the way StanCERA invests its assets. It is an integral part of the overall investment governance structure and is maintained outside the Investment Policy itself. Since these directives are policy in nature, they need to be approved by the Board of Retirement. Staff will be bringing these directives to the Board of Retirement over the next few months as needed.

Directive #2, Investment Strategy Disposition

Directive #2, Investment Strategy Disposition (Attachment 1), adopts a generalized approach to manager evaluation and the criteria that should be looked at when considering the disposition of an investment manager.

Directive #3, Proxies for Illiquid Strategies

Directive #3, Proxies for Illiquid Strategies (Attachment 2), contains language discussing the use of liquid investment alternatives to use while certain strategies are being funded. For example, when StanCERA begins funding its private equity, a liquid strategy such as a passive ETF may be used as a proxy over the course of time that strategy is being invested. While staff is asking the Board to approve the directive in concept today, staff will still bring these liquid alternatives to the Board for final approval when actually necessary.

- VI. RISK: None
- VII. STRATEGIC PLAN: Strategic Objective IV: Refine StanCERA's business and policy practices in ways that enhance stakeholder awareness, the delivery of member services and the ability of the Organization to administer the System effectively and efficiently.
- VIII. ADMINISTRATIVE BUDGET IMPACT: None

Rick Santos, Executive Director



Investment Policy Statement – Directive # 2

Investment Strategy Disposition

Background

Terminating investment strategies can be a highly subjective process incorporating quantitative data, qualitative characteristics, and the fit of the investment strategy into the investment program. Behavioral biases must also be recognized as a contributing factor of the individual and collective decision-making process of the Board. For these reasons, it is necessary to develop a coherent evaluation process that seeks to minimize behavioral biases while properly evaluating all pertinent facts in the investment strategy evaluation process.

Quarterly evaluation of all investment strategies takes place through the review of performance. At this review, each strategy is compared to its appropriate benchmark and peer universe where applicable. Also during this review, changes to the portfolio are noted along with key drivers of performance. Key drivers of performance are expected to align with the stated investment strategy being employed and differences should be noted. Changes to the investment manager of the strategy are also discussed including: organizational changes, regulatory examinations, notable decline of assets under management, and changes to investment philosophy and process.

Annual reviews provided directly by the investment managers are another method of analyzing underperformance of an investment strategy. These discussions further reflect changes to the firm as it seeks to effectively employ the strategy.

An investment directive is needed to provide clarity for the Board, Staff, and outside professionals what is to be considered in the termination process of an investment strategy. This directive would not apply to the portfolio rebalancing due to asset allocation decisions.

Directive

This Directive adopts a generalized approach to investment strategy and investment manager evaluation along the following 6 criteria:

- People and organizational stability;
- Investment philosophy;
- Investment process;
- Pricing against the competitive and passive universe for similar strategies;
- Investment performance on both absolute and relative bases; and
- Regulatory considerations.

This list is intended to provide a framework for investment strategy evaluation, but it is not all-inclusive and other considerations may be incorporated.

When this framework is applied to an investment strategy, the Board shall appoint the General Investment Consultant or Specialty Investment Consultant and Staff, if



Investment Policy Statement – Directive # 2 Investment Strategy Disposition Page 2 of 2

employed, to analyze the investment strategy as outlined and provide a written recommendation to the Board.

Included in the recommendation should be the process by which the assets would be reallocated within the Plan to ensure conformity to the desired asset allocation.

II. Review

This Board shall review this policy / directive at least every three years.

III. History

Reviewed and Amended by the Board of Retirement on _

Adopted by the Board of Retirement	
Rick Santos, Executive Director	
Approval / Adoption Date:	



Investment Policy Statement – Directive # 3

Proxies for Illiquid Strategies

Background

At the May 2016 Board Meeting, the Board of Retirement approved the "FFP 6-year" asset allocation. This asset allocation increases the Plan's allocation to private credit strategies and introduces private equity strategies. At the January 2017 Board Meeting, the Board took a first step towards the FFP 6-year approach by approving the Phase I asset allocation.

Because private equity and private credit (collectively private market) strategies typically require years to draw committed capital and because they typically begin returning capital before ever being fully funded, it is necessary to identify proxy strategies so that the Plan achieves its desired asset allocation. The identified proxy strategies work in concert with the private markets strategies to fulfill capital calls, absorb distributions, and contribute the desired risk and return characteristics to the investment program.

The concept applied to private markets strategies may also be considered for real estate, infrastructure, and other asset classes as determined by future asset allocations.

Directive

This investment strategies identified in this Directive are to serve as proxy strategies listed in the following table:

[Approved Proxy Strategies to be determined by the Board of Retirement]

II. Review

This Board shall review this policy / directive at least every three years.

III. History

Reviewed and Amended by the Board of Retirement on

Adopted by the Board of Retirement

Rick Santos, Executive Director

Approval / Adoption Date:___

Total Fund Flash Report (Net of Fees) - Preliminary

	Market Value	% of Portfolio	1 Mo	Fiscal YTD
Total Fund	1,886,359,589	100.0	1.6	8.0
Policy Index			1.4	5.7
US Equity	818,916,742	43.4	2.1	14.1
US Equity Blended			1.7	12.0
Russell 3000			1.9	10.8
Mellon S&P 500	94,951,008	5.0	1.9	9.9
S&P 500			1.9	9.9
BlackRock Russell 1000 Growth	93,107,809	4.9	3.4	9.3
Russell 1000 Growth			3.4	9.2
Jackson Square	128,303,109	6.8	2.9	5.8
Russell 1000 Growth			3.4	9.2
BlackRock Russell 1000 Value	112,967,254	6.0	0.7	11.2
Russell 1000 Value			0.7	11.2
Dodge & Cox-Equity	198,307,344	10.5	2.3	22.7
Russell 1000 Value			0.7	11.2
Legato Capital	89,254,965	4.7	2.3	13.1
Russell 2000 Growth			1.6	15.0
Capital Prospects	102,025,254	5.4	0.8	22.2
Russell 2000 Value			-0.7	23.3
International Equity	375,277,114	19.9	3.1	10.6
MSCI ACWI ex USA Gross			3.6	9.5
LSV Asset Mgt	190,952,866	10.1	3.4	15.1
MSCI ACWI ex USA Gross			3.6	9.5
Fidelity	184,324,248	9.8	2.7	6.3
MSCI ACWI ex USA Gross			3.6	9.5
US Fixed Income	505,865,444	26.8	0.4	0.4
BBgBarc US Aggregate TR			0.2	-2.3
Dodge & Cox-Fixed	391,066,625	20.7	0.4	0.8
BBgBarc US Aggregate TR			0.2	-2.3
PIMCO	114,798,819	6.1	0.3	-1.2
BBgBarc US Aggregate TR			0.2	-2.3

Period Ending: January 31, 2017

	Current	%	Policy	%
Domestic Equity	\$818,916,742	43.4%	\$720,589,363	38.2%
International Equity	\$375,277,114	19.9%	\$339,544,726	18.0%
Domestic Fixed Income	\$505,865,444	26.8%	\$562,135,158	29.8%
Real Estate	\$78,676,927	4.2%	\$66,022,586	3.5%
Alternatives	\$105,488,330	5.6%	\$198,067,757	10.5%
Cash and Equivalents	\$2,135,032	0.1%		
Total	\$1,886,359,589	100.0%	\$1,886,359,589	100.0%



Policy Index: 14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate TR, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%. US Equity Blended: 80% Russell 1000, 20% Russell 2000. All data is preliminary.



Total Fund Flash Report (Net of Fees) - Preliminary

	Market Value	% of Portfolio	1 Mo	Fiscal YTD
Real Estate	78,676,927	4.2	-0.3	0.2
DJ US Select RESI			-0.9	-4.6
Prime Property Fund	16,890,251	0.9	0.0	4.7
NCREIF-ODCE			0.0	4.2
American Strategic Value Realty	18,851,824	1.0	0.0	5.3
NCREIF Property Index			0.0	3.5
BlackRock US Real Estate	29,758,944	1.6	-0.9	-4.6
DJ US Select RESI TR USD			-0.9	-4.6
Greenfield Gap	13,175,908	0.7		
Direct Lending	93,989,542	5.0		
Medley Capital	23,924,172	1.3		
Raven Capital	18,728,840	1.0		
Raven Opportunity III	13,062,471	0.7		
White Oak Pinnacle	38,274,059	2.0		
Infrastructure	11,498,788	0.6		
MS Infrastructure Partners II	11,498,788	0.6		
Cash Account	2,135,032	0.1	0.0	0.7

Period Ending: January 31, 2017

	Current	%	Policy	%
Domestic Equity	\$818,916,742	43.4%	\$720,589,363	38.2%
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Alternatives	\$105,488,330	5.6%	\$198,067,757	10.5%
Cash and Equivalents	\$2,135,032	0.1%		
Total	\$1,886,359,589	100.0%	\$1,886,359,589	100.0%



Policy Index: 14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate TR, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%. US Equity Blended: 80% Russell 1000, 20% Russell 2000. Cash Account includes cash held at Northern Trust for all closed end funds. All data is preliminary.



Disclosures

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The information presented may be deemed to contain forward-looking information. Examples of forward looking information include, but are not limited to, (a) projections of or statements regarding return on investment, future earnings, interest income, other income, growth prospects, capital structure and other financial terms, (b) statements of plans or objectives of management, (c) statements of future economic performance, and (d) statements of assumptions, such as economic conditions underlying other statements. Such forward-looking information can be identified by the use of forward looking terminology such as believes, expects, may, will, should, anticipates, or the negative of any of the foregoing or other variations thereon comparable terminology, or by discussion of strategy. No assurance can be given that the future results described by the forward-looking information will be achieved. Such statements are subject to risks, uncertainties, and other factors which could cause the actual results to differ materially from future results expressed or implied by such forward looking information. The findings, rankings, and opinions expressed herein are the intellectual property of Verus and are subject to change without notice. The information presented does not claim to be all-inclusive, nor does it contain all information that clients may desire for their purposes. The information presented should be read in conjunction with any other material provided by Verus, investment managers, and custodians.

Verus will make every reasonable effort to obtain and include accurate market values. However, if managers or custodians are unable to provide the reporting period's market values prior to the report issuance, Verus may use the last reported market value or make estimates based on the manager's stated or estimated returns and other information available at the time. These estimates may differ materially from the actual value. Hedge fund market values presented in this report are provided by the fund manager or custodian. Market values presented for private equity investments reflect the last reported NAV by the custodian or manager net of capital calls and distributions as of the end of the reporting period. These values are estimates and may differ materially from the investments actual value. Private equity managers report performance using an internal rate of return (IRR), which differs from the time-weighted rate of return (TWRR) calculation done by Verus. It is inappropriate to compare IRR and TWRR to each other. IRR figures reported in the illiquid alternative pages are provided by the respective managers, and Verus has not made any attempts to verify these returns. Until a partnership is liquidated (typically over 10-12 years), the IRR is only an interim estimated return. The actual IRR performance of any LP is not known until the final liquidation.

Verus receives universe data from InvestorForce, eVestment Alliance, and Morningstar. We believe this data to be robust and appropriate for peer comparison. Nevertheless, these universes may not be comprehensive of all peer investors/managers but rather of the investors/managers that comprise that database. The resulting universe composition is not static and will change over time. Returns are annualized when they cover more than one year. Investment managers may revise their data after report distribution. Verus will make the appropriate correction to the client account but may or may not disclose the change to the client based on the materiality of the change.





PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

PERIOD ENDING: DECEMBER 31, 2016

Investment Performance Review for

Stanislaus County Employees' Retirement Association

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January Flash	TAB II		
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PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

1st QUARTER 2017 Investment Landscape

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4th quarter summary

THE ECONOMIC CLIMATE

- Economies around the globe experienced higher inflation as the effects of lower energy prices fall out of year-over-year inflation figures. U.S. headline inflation rose to 1.7% YoY and the market's inflation expectations increased sharply, as indicated by TIPS breakeven rates. *p. 14*
- U.S. consumer and business sentiment indicators improved markedly in the fourth quarter based on positive expectations of future economic growth.
 p. 12

MARKET PORTFOLIO IMPACTS

- U.S. interest rates moved higher in Q4, returning the yield curve to levels experienced one year ago. The Federal Reserve is not likely to increase rates drastically because of lower yields and economic growth around the globe, and due to an already strong U.S. dollar. *p. 22*
- The U.S. dollar rose 6.4% in Q4 on a trade-weighted basis. Currency movement continues to contribute to higher volatility for investors with unhedged currency exposure. *p. 37*

THE INVESTMENT CLIMATE

- The U.S. presidential election results took many investors by surprise. After an initial overnight plunge in the futures market, U.S. equities rallied on expectations of a more pro-business regulatory environment and the possibility of large-scale fiscal stimulus. U.S. equities may possess greater upside potential post-election. *p. 16*
- Fourth quarter earnings for the S&P 500 are estimated to grow 3.2% YoY, according to FactSet. If this positive growth comes to fruition it will mark the second quarter of positive growth and may indicate that the recent oil-driven earnings slump is behind us. *p. 28*

ASSET ALLOCATION ISSUES

 Global inflation rises in Q4 may mark a change in trend from disinflation seen in recent years. Investors should work to understand the degree of inflation protection in their portfolio. *p. 14 & 19*

A neutral risk stance seems warranted

Global reflation trends should be watched, and investors should understand the degree of inflation protection in their portfolio



What drove the market in Q4?

"World Markets Plunge, Then Steady, On Trump Victory"

POST-ELECTION ASSET PRICE MOVEMENTS

<u>S&P 500</u>		10-Yr Treasury		Bloomberg USD Spot	
Nov 9 th	Dec 30 th	Nov 9 th	Dec 30 th	Nov 9 th	Dec 30 th
2163	2239	2.06%	2.44%	1237	1267

Source: Fortune, November 9th 2016

"U.S. Consumer Sentiment Rises To Highest Level Since 2004"

U OF MICHIGAN CONSUMER SENTIMENT SURVEY

Jul 31st	Aug 31st	Sep 30th	Oct 31st	Nov 30th	Dec 31st
90.0	89.8	91.2	87.2	93.8	98.2

Source: WSJ, December 23rd 2016

"OPEC Reaches Deal To Limit Production, Sending Prices Soaring"

WTI OIL (\$/BARREL)

Jul 29 th	Aug 31 st	Sep 30 th	Oct 31 st	Nov 30 th	Dec 30 th
\$41.60	\$44.70	\$48.24	\$46.86	\$49.44	\$53.72

Source: New York Times, November 30th 2016

"Inflation Expectations Hit Highest Level In More Than A Decade"

10-YEAR U.S. TIPS BREAKEVEN RATE

Jul 29 th	Aug 31 st	Sep 30 th	Oct 31 st	Nov 30 th	Dec 30 th
1.49%	1.47%	1.60%	1.73%	1.94%	1.95%

Source: Financial Times, November 16th 2016

POST-ELECTION ASSET PRICE MOVEMENTS



Source: Bloomberg, 11/8/16-12/31/16

U.S. CONSUMER SENTIMENT



Source: Bloomberg, as of 12/31/16







Economic environment



U.S. economics summary

- U.S. real GDP grew 1.7% YoY in Q3, up from 1.3% in Q2.
 Consumer spending continued to account for the majority of economic growth, and rising sentiment may act as a boon for future growth. Net exports helped boost production, as well as private investment.
- Inflation moved higher during the quarter as headline CPI rose to 1.7% YoY, as of November, while core CPI rose to 2.1%. Increases in energy prices have resulted in a convergence between headline and core inflation figures. If oil prices remain stable, this will act as a tailwind for headline inflation in the future.
- The Fed raised its target federal funds rate to 0.50%-0.75% and forecast three rate hikes in 2017 at its December meeting, citing

continued modest economic growth and a tightening labor market, in addition to firming consumer prices.

- The labor market added 165,000 jobs per month on average during the fourth quarter. This is slightly below the expansion average of 199,000, but still a solid pace of hiring given where we are at in the labor cycle. The unemployment rate fell 0.2% to 4.7% at the end of December.
- While the economy continued to steadily add jobs, wage growth has lagged behind. Real average hourly earnings only increased 0.7% YoY in November. Softer wage growth may be due in part to workers taking on part-time roles who could not find full time work.

	Most Recent	12 Months Prior
GDP (annual YoY)	1.7% 9/30/16	2.2% 9/30/15
Inflation (CPI YoY, Headline)	1.7% 11/30/16	0.4% 11/30/15
Expected Inflation (5yr-5yr forward)	2.1% 12/31/16	1.8% 12/31/15
Fed Funds Rate	0.50% 12/31/16	0.25% 12/31/15
10 Year Rate	2.5% 12/31/16	2.3% 12/31/15
U-3 Unemployment	4.7% 12/31/16	5.0% 12/31/15
U-6 Unemployment	9.2% 12/31/16	9.9% 12/31/15



U.S. economics – GDP growth

In the third quarter U.S. real GDP rose 1.7% YoY, and 3.5% (annualized) from the previous quarter. This marked the highest quarterly growth rate in two years.

Consumer spending continued to be the main driver of overall growth, contributing 2.0% to quarterly GDP growth. During this economic recovery, the American consumer has been aided by low interest rates that have decreased household debt burdens. The pace of interest rate increases will be an important factor in consumer spending moving forward. Net exports and private domestic investment were the next two largest contributors to economic growth. Private domestic investment had been a drag on GDP over the past three quarters and was driven by a positive change in private inventories.

The Atlanta Fed GDP Now forecast as of January 10th for the fourth quarter stood at a 2.9% annualized rate, suggesting the economy is continuing to grow at a slow, but positive rate.

U.S. REAL GDP GROWTH





U.S. GDP COMPONENTS

Source: BEA, annualized quarterly rate, as of 9/30/16



Source: FRED, as of 9/30/16

U.S. economics – Labor market

The U.S. labor market added 165,000 jobs on average in the third quarter, compared to an average of 199,000 during the current economic expansion. The unemployment rate fell to a recovery period low of 4.6% in November before rising to 4.7% in December. The participation rate continued its long-term downtrend to finish the quarter at 62.7%. Much of this effect can likely be explained by demographic changes.

While the overall labor market appears strong, some pockets of weakness may still exist. The broader U-6 unemployment rate that includes people who want a job but have stopped looking and workers who are employed part-time but would like a full-time job currently sits at 9.2%, slightly above prerecession levels. Another indicator of weakness is the lack of recovery in unemployment duration. It still takes job seekers 26 weeks to find a job after being unemployed, on average.

U.S. workers have yet to experience robust wage growth, which we would expect to see under current labor conditions. Real average hourly earnings only rose 0.7% in November.

U.S. UNEMPLOYMENT



UNEMPLOYMENT DURATION



REAL AVERAGE HOURLY EARNINGS



Source: FRED, as of 11/30/16

Verus⁷⁷

Source: FRED, as of 11/30/16

Source: FRED, as of 11/30/16

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U.S. economics - The consumer

The U.S. consumer continued to buoy the overall economy as historically low interest rates have helped reduce debt burdens and provided a tailwind for consumer spending. While low interest rates have decreased consumer debt payments, they have not resulted in a credit boom. Tighter post-recession lending standards created a headwind to consumer loan growth.

Consumer spending grew 1.6% YoY in November, reiterating the trend of modest spending growth over the

past five years. Sales of durable goods, such as autos, however, have displayed relative strength.

Consumer spending has been a relatively strong area of the economy despite only modest gains in wages and personal income. Higher wages could be an important factor for greater spending growth moving forward, especially if interest rates rise, resulting in greater household debt payments.

CONSUMER LOAN GROWTH



CONSUMER SPENDING



HOUSEHOLD DEBT SERVICE



Source: FRED, as of 11/30/16

Source: Bloomberg, as of 10/31/16

Source: FRED, as of 9/30/16

A closer look at household debt burden



Source: Federal Reserve Bank, as of 9/30/16. Household debt service payments are composed of mortgage payments and other consumer payments. This analysis assumes an equal weight of debt burden between mortgage and consumer debt. It is also assumed that interest rates on consumer debt move 1:1 with market rates and effective mortgage rates have only a 5% sensitivity to changes in market rates given the preference for fixed mortgages.



U.S. economics – Sentiment

Consumer sentiment hit its highest level since January 2004 as the University of Michigan sentiment survey reached 98.2 in December. A record 18% of survey respondents spontaneously mentioned that they expected a favorable impact from Trump's economic policies. Favorable expectations of policy changes was the main reason identified for the jump in sentiment.

The Bloomberg Consumer Comfort Index also moved higher during the period. The index rose 4.4 points to

46.0 for the week ending December 25th.

Higher consumer sentiment could have positive flow through effects on the economy if consumers base current spending decisions on expectations of future economic conditions. However, much of this positive sentiment is based on the uncertain economic policies of the new political administration and may only be temporary if these policies do not come to fruition.

CONSUMER COMFORT INDEX



Source: Bloomberg, as of 12/4/16 (see Appendix)

CONSUMER SENTIMENT



Source: University of Michigan, as of 12/9/16 (see Appendix)

ECONOMIC SURPRISE



Source: Bloomberg, as of 11/30/16 (see Appendix)

Verus⁷⁷

A broad rise in confidence

OECD U.S. CONSUMER CONFIDENCE



100 95 90 90 85 Jan-16 Mar-16 May-16 Jul-16 Sep-16 Nov-16

The U.S. has experienced a rise in confidence in nearly all areas of the economy

OECD U.S. BUSINESS CONFIDENCE





U OF MICHIGAN CONSUMER SENTIMENT



Sources: OECD, University of Michigan, NFIB, as of 12/31/16 See Appendix for details regarding the surveys shown above



U.S. economics – Housing

U.S. mortgage rates moved sharply higher during the quarter. The 30-year fixed mortgage rate rose 90 bps to 4.3% to finish the year at its highest rate since April of 2014. If higher mortgage rates are sustained, it will put downward pressure on demand for single-family homes and in turn home prices. However, if mortgage rates rise in tandem with consumer exuberance and higher spending the net effects could in fact be positive.

There is still a large imbalance between supply and demand in the housing market. While the number of

single-family houses for sale has recently increased, the overall supply of houses is well below historical norms. At the end of October, there were only 239,000 homes on the market – very low by historical standards.

Low interest rates and a lack of supply have helped push median home prices well above pre-recession levels. Increasing interest rates and greater supply coming to market could provide a headwind for prices going forward.

30-YEAR FIXED MORTGAGE RATE



SINGLE-FAMILY HOUSES FOR SALE



Source: U.S. Census Bureau, as of 10/31/16, adj. for pop. growth

Source: FRED, as of 9/30/16

\$330

\$300

\$270

\$240

\$210

\$180

\$150

Dec-00

Thousands

Nov-04

MEDIAN HOUSE SALES PRICE



Source: FRED, as of 12/29/16

Oct-08

Sep-12

Aug-16

U.S. economics – Inflation

Realized inflation and future inflation expectations both rose in recent months. Headline CPI was 1.7% YoY in November, up 0.2% from September, while core CPI fell 0.1% during the same time period to 2.1%. Higher rent and energy prices contributed to an increased headline CPI figure.

Market expectations for inflation rose after the U.S. presidential election on anticipation of increased fiscal stimulus from the new administration. The 10-year TIPS breakeven rate finished December at 1.95%, an increase of 35 bps during the quarter.

We believe the risk of inflation is skewed to the upside while the market is only discounting a small rise in prices over the next 10 years. Oil prices appear to have stabilized and may continue higher if global rebalancing occurs faster than anticipated. At the same time, the new political administration's proposed fiscal and trade policies suggest higher inflation. Investors may consider reexamining their inflation protecting portfolio and how their overall portfolio might behave in a rising inflation environment.

U.S. CPI (YOY)



U.S. TIPS BREAKEVEN RATES



Source: FRED, as of 11/30/16

INFLATION EXPECTATIONS



Source: Bloomberg, as of 12/31/16



Source: FRED, as of 11/30/16

Post-election price movements



Source: Bloomberg, 10/3/16-1/10/17


Implications of the election

At first, financial markets reacted negatively to the news of Trump's victory as equity market futures fell sharply the night of the election. S&P 500 futures dropped 6% in a four hour span and then recovered before market open the next morning. Much like Brexit, this was another example where the market's initial response was incorrect and equity prices snapped back quickly.

Risk assets in the U.S. have moved higher while safe haven assets such as Treasuries have declined since the election results on the prospects of improved domestic economic growth.

While a Trump presidency has materially altered the confidence outlook for the U.S. economy, we believe that markets and consumers should avoid overreacting to policies that have yet to be determined in nature and scope.

Although much uncertainty surrounds Trump's actual policy changes, there has been an upswing in confidence in nearly every area of the U.S. economy. Higher confidence from consumers and businesses could have a self-enforcing effect on the economy. At the same time, expectations act as a double edged sword. Increased confidence in the Trump administration's economic policies could leave more room for disappointment.

S&P 500 FUTURES THE NIGHT OF THE ELECTION



Source: Bloomberg, 11/8/16-11/9/16



Trump policies – Initial areas of focus

POLICY AREA	PROPOSED POLICY
Taxes	 Trump has proposed tax cuts for both individuals and corporations that will cost \$4.5 trillion over the next 10 years according to the Center for a Responsible Fiscal Budget. The CFRB has also estimated that more than half of the tax cuts for individuals will go to the richest 1% of Americans on a total dollar basis. Corporate tax rates may be lowered to 15% from the current statutory rate of 35%, although the actual rate paid is estimated at only around 25%.
Trade	 The President has also promised to renegotiate trade deals, such as NAFTA, to better protect American businesses from foreign interests. The details on how he will go about doing so remains unclear. More protectionist policies could result in higher consumer prices as domestic businesses will face less competition.
Deregulation	 Perhaps the biggest unknown is how President Trump will work to lessen regulations on businesses. This may also be the area that he can have the quickest impact through the use of executive orders. Repealing parts of both the Affordable Care Act and the Dodd Frank Act are two of the more notable pieces of regulation Trump has said he will target.
Infrastructure Spending	 President Trump has proposed tax breaks on private infrastructure equity investment that he hopes will result in \$1 trillion of total spending on a levered basis. While the private sector may be able to provide more efficiency, it may be difficult to incentivize them to complete projects that will benefit the public and overall economy.



International economics summary

- The central theme of slow, but positive growth in countries across the globe continued in the third quarter. The U.S., western Europe, and Japan all experienced year-over-year growth rates between 1-2%.
- Developed countries experienced a coordinated pick up in inflation in recent months, suggesting we may be moving into a reflationary environment.
 Headline CPI was up 1.1% in the Eurozone in December, its highest rate in more than three years.
- The ECB announced it would continue its asset purchase program through the initially scheduled end date of March 2017, but at a reduced rate. The program will extend until at least the end of 2017, and monthly

bond purchases will fall to €60 billion from €80 billion in April.

- The tapering of ECB purchases is likely more a result of mechanical and political obstacles than due to a need for tightening. If the central bank is forced to tighten quicker than desired, it could have an adverse impact on the current economic recovery.
- Italy voted against a referendum on constitutional reform on December 4th that would have weakened the power of the Senate in an attempt to make the country easier to govern. The Italian Prime Minister, Matteo Renzi, resigned shortly thereafter. Although Renzi's Democratic party will remain in power, the country's antiestablishment Five Star party has recently gained popularity.

Area	GDP (Real, YoY)	Inflation (CPI, YoY)	Unemployment
United States	1.7% 9/30/16	1.7% 11/30/16	4.7% <i>12/31/16</i>
Western	1.8%	0.9%	8.4%
Europe	9/30/16	12/31/16	9/30/16
Japan	1.1%	0.5%	3.1%
	9/30/16	11/30/16	11/30/16
BRIC Nations	5.1%	3.4%	5.5%
	9/30/16	6/30/16	9/30/16
Brazil	(2.9%) 9/30/16	6.3% <i>12/31/16</i>	11.9% <i>12/31/16</i>
Russia	(0.4%)	5.4%	5.2%
	9/30/16	12/31/16	9/30/16
India	7.3%	3.6%	7.1%
	9/30/16	11/30/16	12/31/15
China	6.7% 9/30/16	2.1% <i>12/31/16</i>	4.0% 12/30/16



International economics

Outside of the U.S., developed market central banks have remained accommodative, which has helped inflation gradually increase and economic growth move forward slowly. Eurozone headline CPI was 1.1% YoY in December, its highest reading in more than three years. Unemployment rates have continued to trend downward, although the European rate is still elevated at 9.8%.

Both the Bank of Japan and European Central Bank have continued their negative rate policies and asset purchase programs, although the ECB announced a tapering of purchases that will begin in April. Especially in Europe, there is a risk that the central bank may need to tighten more quickly than desired due to a lack of eligible bonds to purchase, and perhaps due to political opposition.

Emerging market economies grew at 5.1% in the third quarter based on the combined real GDP of the BRICs countries. Growth in these countries was driven by China and India, while Brazil and Russia remained in recession.

INTERNATIONAL INFLATION



Source: Bloomberg, as of 11/30/16

REAL GDP GROWTH



Source: Bloomberg, as of 9/30/16

GLOBAL UNEMPLOYMENT



Source: Bloomberg, as of 11/30/16 or most recent release



European banking crisis

While the European economic recovery has continued at a modest pace, due in part to extremely accommodative monetary policy, a major systematic risk is still apparent in the financial system. In other areas, such as the United States, banks have worked through the pain of cleaning up their loan books after the financial crisis. Meanwhile, the loan quality in European banks, notably in Italy and Greece, has deteriorated.

Instead of writing off bad loans, many European banks have kept these loans as assets to avoid insolvency. Overall in the Euro Area, the percentage of non-performing loans (NPLs) to total gross loans was 5.4% as of year-end. This number has fallen only slightly since peaking at 7.9% in 2013. Comparatively, this figure in the U.S. was 1.5% at the end of December.

Risks stemming from the Italian financial system may be the most important to the overall health of Europe. As of the last data point, the ratio of NPLs to total gross loans was 18.0% at the end of 2015. In many circumstances, the banks have carried these loans at 50% of face value, when some analysts have suggested they would be more accurately valued at 20-30%. The adverse consequences from these NPLs cannot be avoided and only delayed. Given the risks and the large weight to financials, we believe exposure to European equities should be considered carefully.

NON-PERFORMING LOANS TO TOTAL GROSS LOANS



European equities should be considered carefully given the large exposure to banks

EURO STOXX 600 EX U.K. SECTOR WEIGHTINGS (TOP 10)



Top chart source: World Bank, as of 12/31/16. Data on Italy only available through 12/31/15. Bottom chart source: Stoxx, as of 11/30/16.



Fixed income rates & credit



Interest rate environment

- The Federal Reserve raised interest rates at its December meeting, increasing the federal funds target rate by 0.25%, to a range of 0.50% to 0.75%. The Fed also increased its outlook for the number of 2017 rate hikes from two to three. Lower yields and economic growth outside of the U.S., along with an already strong dollar, reduce the probability of drastic rate rises.
- U.S. Treasury yields moved higher and the curve steepened on the prospects of higher inflation and economic growth. The spread between the 10 and 2-year yields was 1.25% at the end of December, its highest level in more than a year.
- Developed sovereign yields increased along with U.S. rates following the presidential election. The Japanese 10-year bond yield moved out of negative territory to 0.46% at the end of December, while the German 10-year bund yield hit an 11-month high of 0.37% before falling to finish the month at 0.20%.
- The U.S. is much further ahead in the monetary policy cycle than other developed countries, which has led to a widening yield differential between Treasuries and global sovereign bonds. While Treasuries remain expensive compared to history, the higher yield makes them relatively attractive.

Area	Short Term (3M)	10 Year
United States	0.50%	2.45%
Germany	(0.99%)	0.20%
France	(0.90%)	0.68%
Spain	(0.49%)	1.38%
Italy	(0.50%)	1.81%
Greece	1.37%	7.02%
U.K.	0.51%	1.24%
Japan	(0.42%)	0.04%
Australia	1.70%	2.77%
China	2.35%	3.06%
Brazil	12.91%	10.55%
Russia	8.78%	8.29%

Source: Bloomberg, as of 12/31/16



Yield environment



YIELD CURVE CHANGES OVER LAST FIVE YEARS



GLOBAL GOVERNMENT YIELD CURVES



Global investors continue to prefer U.S. Treasuries due to higher relative yields

IMPLIED CHANGES OVER NEXT YEAR



Source: Bloomberg, as of 12/31/16



Credit environment

High yield returns across all sectors - energy and metals and mining in particular - have been strong since the trough in Q1. As evidence of this performance, high yield spreads have compressed to below 4.3% as of December from a high of 8.0% earlier in the year.

U.S. credit markets showed surprising strength following a brief period of increased volatility in Q1. While below the long-term trend, U.S. GDP growth has begun to show signs of improvement which has provided a tailwind to credit markets in general. Overall foreign demand for U.S. credit issuance has remained positive as low developed market yields have been supportive of the "carry trade", where investors buy relatively higher yielding assets.

The Federal Reserve Bank moved to increase rates by 0.25% in December and hinted at higher rates in 2017. Continued growth in the job market and increasing inflation were key considerations for the increase. While rising rates may increase borrowing costs and put downward pressure on bond prices, the U.S. credit market remains attractive compared to other developed markets.

CREDIT SPREADS



Source: Barclays Capital Indices, Bloomberg, as of 12/31/16

HIGH YIELD SECTOR SPREADS

SPREADS

1600				
1300				\bigwedge
1000			$-\Lambda$	
700	***	~ ~ ~		
400				
100				
Ар	r-12	Aug-13	Dec-14	May-16

Market	(12/31/16)	(1 Year Ago)
Long US Corporate	1.5%	2.1%
US Aggregate	0.9%	1.1%
US High Yield	4.4%	7.1%
US High Yield Energy	4.6%	13.6%
US Bank Loans	3.9%	3.9%

Source: Bloomberg, as of 12/31/16

Source: Barclays, Credit Suisse, Bloomberg, as of 12/31/16



Issuance and default

Defaults have been trending higher from their lows in 2014 due mostly to lower commodity prices. While the current level of default have risen above the trailing 20-year average, it remains below the peak in 2002 and 2009, respectively.

Corporate issuance in emerging markets has remained strong due mainly to perceived relative value compared to developed market corporates. Rising U.S. rates will most likely result in increased borrowing costs. Issuance in both high yield bonds and bank loans has been trending lower. Some of the fall in issuance volume can be attributed to the recent sell off in the energy sector. Additionally, rising U.S. interest rates have resulted in increased borrowing costs which has acted as a headwind.

HY DEFAULT TRENDS (ROLLING 1 YEAR)



EM DEBT ISSUANCE



Source: JP Morgan, as of 11/30/16

GLOBAL ISSUANCE



Source: Bloomberg, BofA Merrill Lynch, as of 12/31/16



Source: Credit Suisse, BofA, as of 12/31/16





Equity environment

- We believe the U.S. election results have had a material impact on possible future equity return outcomes. There is likely greater upside potential for U.S. equities, though some of this has already been priced in with higher prices post-election.
- Both consumer and private sector sentiment have risen robustly. This positive shift may provide a tailwind to U.S. economic growth through spending and investment.
- Fourth quarter earnings for the S&P 500 are estimated to grow
 3.2% year-over-year, according to FactSet. If this positive growth comes to fruition it will mark the second quarter of positive growth and may mean the recent earnings slump is now behind us.

- Value equities outperformed growth equities in the fourth quarter. The Russell 1000 Value index and Russell 1000 Growth index returned 6.7% and 1.0%, respectively. Energy and financial service companies have contributed to the performance rebound.
- The U.S. dollar rose 6.4% in Q4 on a trade-weighted basis which directly detracts from investment returns of U.S. investors with unhedged currency exposure.
- Japanese equities (Nikkei 225) delivered a 16.1% return on a hedged basis, but 1.2% on an unhedged basis – a 15% swing caused by currency movement.

	QTD TOTAI	L RETURN	YTD TOTAI	. RETURN	1 YEAR TOTAL RETURN			
	(unhedged)	(hedged)	(unhedged)	(hedged)	(unhedged)	(hedged)		
US Large Cap (Russell 1000)	3.8	%	12.:	1%	12.1	1%		
US Small Cap (Russell 2000)	8.8	%	21.3	3%	21.3	21.3%		
US Large Value (Russell 1000 Value)	6.7	%	17.3	3%	17.3%			
US Large Growth (Russell 1000 Growth)	1.0	%	7.1	%	7.1	7.1%		
International Large (MSCI EAFE)	(-0.7%)	7.3%	1.5%	6.2%	1.5%	6.2%		
Eurozone (Euro Stoxx 50)	3.2%	10.3%	0.7%	5.1%	0.7%	5.1%		
U.K. (FTSE 100)	(0.8%)	4.4%	(0.2%)	19.0%	(0.2%)	19.0%		
Japan (NIKKEI 225)	1.2%	16.1%	5.8%	1.3%	5.8%	1.3%		
Emerging Markets (MSCI Emerging Markets)	(4.1%)	(2.0%)	11.6%	7.5%	11.6%	7.5%		

Source: Russell Investments, MSCI, STOXX, FTSE, Nikkei, as of 12/31/16



Domestic equity

U.S. equity markets fell sharply in futures markets on the night of the election, but then recovered before market open the next morning. After this initial stumble, equities rallied higher to finish the quarter.

Post-election equity movement was likely driven by an improved economic outlook as well as several proposed policy changes that would benefit corporations, including lower tax rates and deregulation. The financials sector was responsible for much of the gain in equity prices, likely due to the prospects of higher rates and a steeper curve. The S&P 500 Financials sector was up 16.5% after the election, compared to a 2.8% gain across the rest of the index.

As of December 30th, estimated earnings growth for the fourth quarter was 3.2% from the previous year, according to FactSet. Looking ahead, bottom-up analyst EPS forecasts point toward improving corporate earnings growth.

Proposed tax reform and deregulation have helped improve the U.S. earnings outlook

U.S. EQUITIES



S&P 500 EPS



S&P 500 FINANCIALS



Source: Russell Investments, as of 12/30/16

Source: FactSet, as of 12/30/16

Source: Bloomberg, as of 12/30/16



Domestic equity size and style

Small cap equities outperformed large cap equities in the fourth quarter as the Russell 2000 Index and Russell 1000 Index returned 8.8% and 3.8%, respectively. Much of this outperformance came after the U.S. presidential election as smaller companies could receive greater marginal benefit from deregulation proposed by Donald Trump. Renewed U.S. dollar strength also benefits smaller companies relative to larger companies due to greater insulation from foreign currency movements. Value equities outperformed growth equities during the quarter. The Russell 1000 Value Index and Russell 1000 Growth Index returned 6.7% and 1.0%, respectively. This relative outperformance was driven by the Financials and Energy sectors, which are the two largest sectors in the value index. The magnitude of this recent value bounce back has brought the value premium back into positive territory for most trailing windows.

SMALL CAP VS LARGE CAP (YOY)



VALUE VS GROWTH (YOY)



U.S. VALUE VS. GROWTH RELATIVE PERFORMANCE



Source: Russell Investments, as of 12/31/16

Source: Russell Investments, as of 12/31/16

Source: Morningstar, as of 12/31/16



International equity

International equity markets narrowly outperformed domestic equities in December (S&P 500 2.0%) as the MSCI ACWI ex U.S. returned 2.2%.

European equity markets remained calm on the back of the announcement that the ECB would continue its asset purchase program through the initially scheduled end date of March 2017, but at a reduced rate. Adjustments to program constraints will be likely, given the mandated rule that the ECB cannot purchase more than 33% of any one country's national debt. International developed equities delivered a 7.3% total return on a hedged basis over the quarter, but delivered -0.7% on an unhedged basis. Unhedged currency exposure continues to cause higher volatility for investors who choose not to hedge.

Japanese equities delivered a 16.1% return on a hedged basis, but 1.2% on an unhedged basis – a 15% swing caused by currency movement. Expectations of continued loose monetary policy and low interest rates in Japan contributed to yen weakness.

GLOBAL EQUITY PERFORMANCE



INTERNATIONAL FORWARD P/E RATIOS



EFFECT OF CURRENCY (1 YEAR ROLLING)



Source: Bloomberg, as of 12/31/16

Source: Bloomberg, as of 12/31/16

Source: MSCI, as of 12/31/16



Emerging market equity

Emerging market economic growth has shown recovery as Russia and Brazil begin moving out of severe depressions and as commodity prices improve. Economic growth of the "BRIC" nations continues at a pace materially higher than that of developed nations, consistent with recent decades.

Some renewed investor optimism can be seen as equity valuations move higher. Emerging market equities

provided a muted quarter with a -2.0% return on a hedged basis, but delivered a positive 7.5% return for the year (MSCI Emerging Markets). Much of the recent performance stability can be attributed to a reversal or flattening of emerging market currency depreciation trends occurring since 2012. Earnings across the broader emerging markets have also reversed their downward trend, though not as quickly as the pace of price improvement as demonstrated in higher equity valuations.

12-MONTH ROLLING PERFORMANCE



FORWARD P/E RATIOS



Source: Bloomberg, as of 12/31/16

CDS SPREADS



Source: MSCI, as of 12/31/16

Source: MPI, as of 12/31/16

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Equity valuations

The forward P/E ratio for the S&P 500 was 18.8 at yearend and remains above the long-term average of 16.9 since 1995. The current P/E of 18.8 places it in the 79^{th} percentile.

While elevated, valuations for U.S. large cap equities remain within one standard deviation of the average. The expected pick up in corporate earnings would help bring P/E ratios more in line with long-term averages, all else equal.

MSCI VALUATION METRICS (3 MONTH AVERAGE)



Low real interest rate and inflation environments have historically supported higher equity valuations, meaning current valuations may not be unusual given the conditions.

International developed valuations expanded during the quarter, especially in Europe, but are still relatively cheap compared to the U.S. Emerging market P/E ratios expanded off historic lows and emerging market equities remain relatively attractive from a valuation standpoint.

S&P 500 FORWARD P/E



INTERNATIONAL FORWARD P/E RATIOS



Source: MSCI, as of 12/31/16

Source: Bloomberg, as of 12/31/16

Source: Bloomberg, as of 12/31/16



Equity volatility

Equity volatility has remained subdued, despite the arguably surprising U.S. election results and uncertain future policy environment. However, uncertainty surrounding a set of policies with highly unclear ramifications for the markets is different from uncertainty in the traditional sense.

Low implied volatility, as shown by the VIX index, is consistent with the renewed bull market in U.S.

equities. Realized risk has also been low across international developed equity markets (MSCI EAFE).

Unhedged currency exposure has resulted in materially higher volatility and often significant variation in equity portfolio performance.



U.S. IMPLIED EQUITY VOLATILITY

INTERNATIONAL EQUITY VOLATILITY



Source: MSCI, as of 12/31/16



Source: CBOE, as of 12/30/16

Long-term equity performance



Source: MPI, as of 12/31/16







Real estate & REITs

After six consecutive years of double digit returns in core real estate, 2016 is on pace to come in around 8-9% - still a very good return, but slightly down from the pace of recent history.

Fundamentals remain strong with generally declining vacancy rates. The exception is multifamily, where vacancies have come up slightly off historic lows. NOI growth rates are positive and strong for all property types, near or above 5% for all over the last year.

New supply remains below historical averages in all property types except multifamily. Continued tight lending standards have kept new construction, especially speculative construction, under control relative to previous cycles.

Pricing from a cap rate perspective looks historically high at 4.5%, however relative spreads to Treasuries remain healthy. Rising interest rates could put pressure on pricing, but the spread keeps a small cushion in place.

VACANCY RATES



NET OPERATING INCOME GROWTH



CAP RATES AND SPREADS



Source: NCREIF, as of 9/30/16

Source: NCREIF, as of 9/30/16

Source: NCREIF, as of 9/30/16

Currency

The U.S. dollar rose considerably in the fourth quarter, up 6.4% against a basket of major currencies. The strong dollar created a large gap between hedged and unhedged international exposures, as foreign currency losses eroded unhedged returns.

Renewed dollar strength occurred after the presidential election likely due to increased expectations of U.S. economic growth and higher interest rates. A widening gap between Treasury yields and other developed sovereign bonds could cause greater demand for Treasuries and provide a tailwind for further dollar appreciation. However, higher inflation at the same time could offset some of the potential strength.

Emerging market currencies were hit hard by the strength in the U.S. dollar, influenced by the Fed pointing towards faster than anticipated interest rates increases and possible protectionist trade policies from the Trump administration. The JPM EM Currency Index was down 4.0% in the fourth quarter.

EFFECT OF CURRENCY (1YR ROLLING)



LONG-TERM TRADE WEIGHTED DOLLAR



JPM EM CURRENCY INDEX



Source: MPI, as of 12/31/16

Source: FRED, as of 12/31/16

Source: Bloomberg, as of 12/31/16



Appendix



Periodic table of returns – December 2016

BEST		1002	1004	1005	1000	4007	4000	4000	2000	2004	2002	2002	2004	2005	2000	2007	2000	2000	204.0	2014	2012	2012	2014	2045	2016	E Maran	10
_ ▲	Small Can Value	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	1/1 3	18.6	2013	13 5	10.1	2016	5-Year	10-Year
	Small Cap Equity	32.9	8.1	37.8	23.2	32.9	27.0	43.1	22.8	8.4	10.3	48.5	22.2	21.4	26.9	16.2	1.4	37.2	26.9	7.8	18.1	38.8	13.2	5.7	21.3	14.8	7.8
	Large Cap Value	26.3	6.4	37.2	22.4	31.8	20.3	33.2	12.2	7.3	6.7	47.3	20.7	20.1	23.5	15.8	-6.5	34.5	24.5	2.6	17.9	34.5	13.0	0.9	17.3	14.7	7.2
	Large Cap Equity	23.8	4.4	31.0	21.6	30.5	19.3	27.3	11.6	3.3	1.6	46.0	18.3	14.0	22.2	11.8	-21.4	32.5	19.2	1.5	17.5	33.5	11.8	0.6	12.1	14.5	7.1
	Commodities	19.3	3.2	28.5	21.4	22.4	16.2	26.5	7.0	2.8	1.0	39.2	16.5	7.5	18.4	11.6	-25.9	28.4	16.8	0.4	16.4	33.1	6.0	0.0	11.8	14.5	7.1
	Small Cap Growth	18.9	2.6	25.7	16.5	16.2	15.6	24.3	6.0	2.5	-5.9	30.0	14.5	7.1	16.6	10.9	-28.9	27.2	16.7	0.1	16.3	32.5	5.6	-0.4	11.3	13.7	6.3
	Emerging Markets Equity	18.1	0.4	19.6	14.4	13.9	8.7	21.3	4.1	-2.4	-6.0	29.9	14.3	6.3	15.5	10.3	-33.8	23.3	16.1	-2.1	15.3	23.3	4.9	-0.8	11.2	11.2	5.7
	Large Cap Growth	13.4	-1.5	18.5	11.3	12.9	4.9	20.9	-3.0	-5.6	-11.4	29.7	12.9	5.3	15.1	7.0	-35.6	20.6	15.5	-2.9	14.6	12.1	4.2	-1.4	7.1	6.5	4.3
	Real Estate	10.2	-1.8	15.2	10.3	10.6	1.2	13.2	-7.3	-9.1	-15.5	25.2	11.4	4.7	13.3	7.0	-36.8	19.7	13.1	-4.2	11.5	11.0	3.4	-2.5	6.1	5.8	3.8
	60/40 Global Portfolio	9.7	-2.0	11.6	9.9	9.7	-2.5	11.4	-7.8	-9.2	-15.7	23.9	9.1	4.6	10.4	5.8	-37.6	18.9	10.2	-5.5	10.5	9.0	2.8	-3.8	5.7	3.4	1.8
	US Bonds	3.1	-2.4	11.1	6.4	5.2	-5.1	7.3	-14.0	-12.4	-20.5	11.6	6.9	4.6	9.1	4.4	-38.4	11.5	8.2	-5.7	4.8	0.1	0.0	-4.4	2.6	2.2	1.3
	International Equity	2.9	-2.9	7.5	6.0	2.1	-6.5	4.8	-22.4	-19.5	-21.7	9.0	6.3	4.2	4.8	-0.2	-38.5	5.9	6.5	-11.7	4.2	-2.0	-1.8	-7.5	1.0	1.3	0.7
	Hedge Funds of Funds	1.4	-3.5	5.7	5.1	-3.4	-25.3	-0.8	-22.4	-20.4	-27.9	4.1	4.3	3.2	4.3	-1.6	-43.1	0.2	5.7	-13.3	0.1	-2.3	-4.5	-14.9	0.5	0.1	0.7
¥	Cash	-1.1	-7.3	-5.2	3.6	-11.6	-27.0	-1.5	-30.6	-21.2	-30.3	1.0	1.4	2.4	2.1	-9.8	-53.2	-16.9	0.1	-18.2	-1.1	-9.5	-17.0	-24.7	0.3	-9.0	-5.6
ORST				Large	Cap E	quity					Small	Cap G	rowth					Comm	noditie	es							
3	Large Cap Value					Interr	nation	al Equ	ity				Real E	state													
				Large	Сар С	Growth	1				Emerging Markets Equity					Hedge	e Fund	s of Fu	nds								
				Small	Cap E	quity					US Bonds					60% MSCI ACWI/40% BC Global Bond											
	Small Cap Value Cash																										

Source Data: Morningstar, Inc., Hedge Fund Research, Inc. (HFR), National Council of Real Estate Investment Fiduciaries (NCREIF). Indices used: Russell 1000, Russell 1000 Value, Russell 1000 Growth, Russell 2000, Russell 2000 Value, Russell 2000 Growth, MSCI EAFE, MSCI EM, BC Agg, T-Bill 90 Day, Bloomberg Commodity, NCREIF Property, HFRI FOF, MSCI ACWI, BC Global Bond. NCREIF Property performance data as of 9/30/16.



Major asset class returns

ONE YEAR ENDING DECEMBER



TEN YEARS ENDING DECEMBER

Source: Morningstar, as of 12/31/16

Source: Morningstar, as of 12/31/16



S&P 500 and S&P 500 sector returns



ONE YEAR ENDING DECEMBER

Source: Morningstar, as of 12/30/16

Source: Morningstar, as of 12/30/16



Detailed index returns

DOMESTIC EQUITY							
	Month	QTD	YTD	1 Year	3 Year	5 Year	10 Year
Core Index							
S&P 500	2.0	3.8	12.0	12.0	8.9	14.7	6.9
S&P 500 Equal Weighted	1.1	3.8	14.8	14.8	8.7	15.5	8.4
DJ Industrial Average	3.4	8.7	16.5	16.5	8.7	12.9	7.5
Russell Top 200	2.2	4.1	11.3	11.3	8.9	14.7	6.8
Russell 1000	1.9	3.8	12.1	12.1	8.6	14.7	7.1
Russell 2000	2.8	8.8	21.3	21.3	6.7	14.5	7.1
Russell 3000	2.0	4.2	12.7	12.7	8.4	14.7	7.1
Russell Mid Cap	1.1	3.2	13.8	13.8	7.9	14.7	7.9
Style Index							
Russell 1000 Growth	1.2	1.0	7.1	7.1	8.6	14.5	8.3
Russell 1000 Value	2.5	6.7	17.3	17.3	8.6	14.8	5.7
Russell 2000 Growth	1.4	3.6	11.3	11.3	5.1	13.7	7.8
Russell 2000 Value	4.1	14.1	31.7	31.7	8.3	15.1	6.3

	Month	QTD	YTD	1 Year	3 Year	5 Year	10 Year
Broad Index							
BBgBarc US Treasury US TIPS	(0.1)	(2.4)	4.7	4.7	2.3	0.9	4.4
BBgBarc US Treasury Bills	0.0	0.1	0.4	0.4	0.2	0.2	0.9
BBgBarc US Agg Bond	0.1	(3.0)	2.6	2.6	3.0	2.2	4.3
Duration							
BBgBarc US Treasury 1-3 Yr	0.0	(0.5)	0.9	0.9	0.7	0.6	2.1
BBgBarc US Treasury Long	(0.5)	(11.7)	1.3	1.3	7.8	2.5	6.7
BBgBarc US Treasury	(0.1)	(3.8)	1.0	1.0	2.3	1.2	4.0
Issuer							
BBgBarc US MBS	(0.0)	(2.0)	1.7	1.7	3.1	2.1	4.3
BBgBarc US Corp. High Yield	1.8	1.8	17.1	17.1	4.7	7.4	7.5
BBgBarc US Agency Interm	(0.0)	(1.1)	1.1	1.1	1.5	1.1	3.2
BBgBarc US Credit	0.6	(3.0)	5.6	5.6	4.1	3.8	5.3

FIXED INCOME

OTHER

INTERNATIONAL EQUITY

	Month	QTD	YTD	1 Year	3 Year	5 Year	10 Year
Broad Index							
MSCI ACWI	2.2	1.2	7.9	7.9	3.1	9.4	3.6
MSCI ACWI ex US	2.6	(1.3)	4.5	4.5	(1.8)	5.0	1.0
MSCI EAFE	3.4	(0.7)	1.0	1.0	(1.6)	6.5	0.7
MSCI EM	0.2	(4.2)	11.2	11.2	(2.6)	1.3	1.8
MSCI EAFE Small Cap	2.9	(2.9)	2.2	2.2	2.1	10.6	2.9
Style Index							
MSCI EAFE Growth	2.2	(5.5)	(3.0)	(3.0)	(1.2)	6.7	1.6
MSCI EAFE Value	4.6	4.2	5.0	5.0	(2.1)	6.3	(0.2)
Regional Index							
MSCI UK	4.1	(0.9)	(0.1)	(0.1)	(4.4)	4.0	0.3
MSCI Japan	1.0	(0.2)	2.4	2.4	2.5	8.2	0.5
MSCI Euro	6.6	2.0	1.4	1.4	(3.3)	7.1	(0.6)
MSCI EM Asia	(1.4)	(6.1)	6.1	6.1	0.1	4.4	3.4
MSCI EM Latin American	0.9	(0.9)	31.0	31.0	(7.5)	(5.7)	0.3

	Month	QTD	YTD	1 Year	3 Year	5 Year	10 Year
Index							
Bloomberg Commodity	1.8	2.7	11.8	11.8	(11.3)	(9.0)	(5.6)
Wilshire US REIT	4.9	(2.3)	7.2	7.2	13.8	12.0	4.8
Regional Index							
JPM EMBI Global Div	1.3	(4.0)	10.2	10.2	6.2	5.9	6.9
JPM GBI-EM Global Div	1.9	(6.1)	9.9	9.9	(4.1)	(1.3)	3.8
Hedge Funds							
HFRI Composite	1.1	1.3	5.6	5.6	2.4	4.5	3.4
HFRI FOF Composite	0.9	0.8	0.5	0.5	1.2	3.4	1.3
Currency (Spot)							
Euro	(0.6)	(6.1)	(2.9)	(2.9)	(8.5)	(4.1)	(2.2)
Pound	(1.1)	(4.9)	(16.2)	(16.2)	(9.3)	(4.5)	(4.5)
Yen	(2.3)	(13.2)	3.1	3.1	(3.4)	(8.0)	0.2

Source: Morningstar, as of 12/31/16



Definitions

Bloomberg US Weekly Consumer Comfort Index - tracks the public's economic attitudes each week, providing a high-frequency read on consumer sentiment. The index, based on cell and landline telephone interviews with a random, representative national sample of U.S. adults, tracks Americans' ratings of the national economy, their personal finances and the buying climate on a weekly basis, with views of the economy's direction measured separately each month. (www.langerresearch.com)

University of Michigan Consumer Sentiment Index - A survey of consumer attitudes concerning both the present situation as well as expectations regarding economic conditions conducted by the University of Michigan. For the preliminary release approximately three hundred consumers are surveyed while five hundred are interviewed for the final figure. The level of consumer sentiment is related to the strength of consumer spending. (www.Bloombera.com)

Citi Economic Surprise Index - objective and quantitative measures of economic news. Defined as weighted historical standard deviations of data surprises (actual releases vs Bloomberg survey median). A positive reading of the Economic Surprise Index suggests that economic releases have on balance been beating consensus. The indices are calculated daily in a rolling three-month window. The weights of economic indicators are derived from relative high-frequency spot FX impacts of 1 standard deviation data surprises. The indices also employ a time decay function to replicate the limited memory of markets. (www.Bloomberg.com)

Merrill Lynch Option Volatility Estimate (MOVE) Index – a yield curve weighted index comprised of a weighted set of 1-month Treasury options, including 2.5.10 and 30 year tenor contracts. This index is an indicator of the expected (implied) future volatility in the rate markets. (www.Bloomberg.com)

OECD Consumer Confidence Index - based on households' plans for major purchases and their economic situation, both currently and their expectations for the immediate future. Opinions compared to a "normal" state are collected and the difference between positive and negative answers provides a qualitative index on economic conditions. (<u>https://data.oecd.org/</u>)

OECD Business Confidence Index - based on enterprises' assessment of production, orders and stocks, as well as its current position and expectations for the immediate future. Opinions compared to a "normal" state are collected and the difference between positive and negative answers provides a qualitative index on economic conditions. (<u>https://data.oecd.org/</u>)

NFIB Small Business Outlook - Small Business Economic Trends (SBET) is a monthly assessment of the U.S. small-business economy and its near-term prospects. Its data are collected through mail surveys to random samples of the National Federal of Independent Business (NFIB) membership. The survey contains three broad question types: recent performance, near-term forecasts, and demographics. The topics addressed include: outlook, sales, earnings, employment, employee compensation, investment, inventories, credit conditions, and single most important problem. (<u>http://www.nfib-sbet.org/about/</u>)

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Total Fund Flash Report (Net of Fees) - Preliminary

	Market Value	% of Portfolio	1 Mo	Fiscal YTD
Total Fund	1,886,359,589	100.0	1.6	8.0
Policy Index			1.4	5.7
US Equity	818,916,742	43.4	2.1	14.1
US Equity Blended			1.7	12.0
Russell 3000			1.9	10.8
Mellon S&P 500	94,951,008	5.0	1.9	9.9
S&P 500			1.9	9.9
BlackRock Russell 1000 Growth	93,107,809	4.9	3.4	9.3
Russell 1000 Growth			3.4	9.2
Jackson Square	128,303,109	6.8	2.9	5.8
Russell 1000 Growth			3.4	9.2
BlackRock Russell 1000 Value	112,967,254	6.0	0.7	11.2
Russell 1000 Value			0.7	11.2
Dodge & Cox-Equity	198,307,344	10.5	2.3	22.7
Russell 1000 Value			0.7	11.2
Legato Capital	89,254,965	4.7	2.3	13.1
Russell 2000 Growth			1.6	15.0
Capital Prospects	102,025,254	5.4	0.8	22.2
Russell 2000 Value			-0.7	23.3
International Equity	375,277,114	19.9	3.1	10.6
MSCI ACWI ex USA Gross			3.6	9.5
LSV Asset Mgt	190,952,866	10.1	3.4	15.1
MSCI ACWI ex USA Gross			3.6	9.5
Fidelity	184,324,248	9.8	2.7	6.3
MSCI ACWI ex USA Gross			3.6	9.5
US Fixed Income	505,865,444	26.8	0.4	0.4
BBgBarc US Aggregate TR			0.2	-2.3
Dodge & Cox-Fixed	391,066,625	20.7	0.4	0.8
BBgBarc US Aggregate TR			0.2	-2.3
PIMCO	114,798,819	6.1	0.3	-1.2
BBgBarc US Aggregate TR			0.2	-2.3

Period Ending: January 31, 2017

	Current	%	Policy	%
Domestic Equity	\$818,916,742	43.4%	\$720,589,363	38.2%
International Equity	\$375,277,114	19.9%	\$339,544,726	18.0%
Domestic Fixed Income	\$505,865,444	26.8%	\$562,135,158	29.8%
Real Estate	\$78,676,927	4.2%	\$66,022,586	3.5%
Alternatives	\$105,488,330	5.6%	\$198,067,757	10.5%
Cash and Equivalents	\$2,135,032	0.1%		
Total	\$1,886,359,589	100.0%	\$1,886,359,589	100.0%



Policy Index: 14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate TR, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%. US Equity Blended: 80% Russell 1000, 20% Russell 2000. All data is preliminary.



Total Fund Flash Report (Net of Fees) - Preliminary

	Market Value	% of Portfolio	1 Mo	Fiscal YTD
Real Estate	78,676,927	4.2	-0.3	0.2
DJ US Select RESI			-0.9	-4.6
Prime Property Fund	16,890,251	0.9	0.0	4.7
NCREIF-ODCE			0.0	4.2
American Strategic Value Realty	18,851,824	1.0	0.0	5.3
NCREIF Property Index			0.0	3.5
BlackRock US Real Estate	29,758,944	1.6	-0.9	-4.6
DJ US Select RESI TR USD			-0.9	-4.6
Greenfield Gap	13,175,908	0.7		
Direct Lending	93,989,542	5.0		
Medley Capital	23,924,172	1.3		
Raven Capital	18,728,840	1.0		
Raven Opportunity III	13,062,471	0.7		
White Oak Pinnacle	38,274,059	2.0		
Infrastructure	11,498,788	0.6		
MS Infrastructure Partners II	11,498,788	0.6		
Cash Account	2,135,032	0.1	0.0	0.7

Period Ending: January 31, 2017

	Current	%	Policy	%
Domestic Equity	\$818,916,742	43.4%	\$720,589,363	38.2%
International Equity	\$375,277,114	19.9%	\$339,544,726	18.0%
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Cash and Equivalents	\$2,135,032	0.1%		
Total	\$1,886,359,589	100.0%	\$1,886,359,589	100.0%



Policy Index: 14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate TR, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%. US Equity Blended: 80% Russell 1000, 20% Russell 2000. Cash Account includes cash held at Northern Trust for all closed end funds. All data is preliminary.



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Stanislaus County Employees' Retirement Association

Investment Performance Review Period Ending: December 31, 2016



VERUSINVESTMENTS.COM

SEATTLE 206-622-3700 LOS ANGELES 310-297-1777 SAN FRANCISCO 415-362-3484

Last Three Fiscal Year-To-Date Year-To-Date Months Beginning Market Value \$1,835,627,169 \$1,763,136,187 \$1,754,035,445 Net Cash Flow -\$11,378,428 -\$18,206,250 -\$36,239,771 Net Investment Change \$35,494,164 \$114,812,968 \$141,947,231 Ending Market Value \$1,859,742,905 \$1,859,742,905 \$1,859,742,905

Portfolio Reconciliation

Change in Market Value Last Three Months



Contributions and withdrawals may include intra-account transfers between managers/funds.





Market Value History

Verus⁷⁷

Total Fund Asset Allocation vs. Policy

Current	Policy		Current Balance	Current Allocation	Policy	Difference	Policy Range	Within IPS Range?
5.0%	4.8%	Domestic Equity Large Cap Core	\$93,182,114	5.0%	4.8%	\$3,914,455	3.8% - 5.8%	Yes
11.5%	11.3%	Domestic Equity Large Cap Growth	\$214,681,073	11.5%	11.3%	\$4,530,125	7.8% - 14.8%	Yes
		Domestic Equity Large Cap Value	\$306,006,282	16.5%	14.4%	\$38,203,304	11.4% - 17.4%	Yes
	14 4%	Domestic Equity Small Cap Growth	\$87,158,467	4.7%	3.7%	\$18,347,980	2.7% - 4.7%	Yes
16.5%	14.470	Domestic Equity Small Cap Value	\$101,120,078	5.4%	4.0%	\$26,730,361	3.0% - 5.0%	No
	3.7%	International Equity	\$364,071,130	19.6%	18.0%	\$29,317,407	15.0% - 21.0%	Yes
4.7%	4.0%	Domestic Fixed Income	\$509,200,188	27.4%	29.8%	-\$45,003,197	26.0% - 33.6%	Yes
	4.0 %	Real Estate	\$78,933,928	4.2%	3.5%	\$13,842,926	1.0% - 4.5%	Yes
5.4%		Direct Lending	\$91,768,734	4.9%	7.5%	-\$47,711,984	2.5% - 9.0%	Yes
		Infrastructure	\$11,498,788	0.6%	3.0%	-\$44,293,499	0.0% - 4.0%	Yes
	18.0%	Cash and Equivalents	\$2,122,122	0.1%	0.0%	\$2,122,122	0.0% - 2.0%	Yes
19.6%		Total	\$1,859,742,905	100.0%	100.0%			
27.4%	29.8%							
4.2%								
4.9%	7.5%							
0.6%	0.070							

Cash Account includes cash held at Northern Trust for all closed end funds.



Total Fund Executive Summary (Gross of Fees)

	QTD	Fiscal YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs
Total Fund	1.9	6.5	8.2	4.9	9.6	5.7
Policy Index	1.0	4.2	8.2	5.3	8.6	5.7
InvestorForce Public DB Gross Rank	5	3	31	33	12	23
US Equity	5.2	12.0	12.4	7.6	15.1	6.7
US Equity Blended	4.9	10.1	13.9	8.3	14.8	7.4
Russell 3000	4.2	8.8	12.7	8.4	14.7	7.1
InvestorForce All DB US Eq Gross Rank	25	11	58	59	15	71
International Equity	0.2	7.6	5.7	-0.8	6.7	2.0
MSCI ACWI ex USA Gross	-1.2	5.7	5.0	-1.3	5.5	1.4
InvestorForce All DB ex-US Eq Gross Rank	10	15	24	46	44	31
US Fixed Income	-1.4	0.1	5.4	3.9	4.0	5.6
BBgBarc US Aggregate TR	-3.0	-2.5	2.6	3.0	2.2	4.3
InvestorForce All DB US Fix Inc Gross Rank	26	25	47	38	40	39
Real Estate	0.4	0.8	7.5	15.7	10.6	
DJ US Select RESI	-2.5	-3.7	6.6	13.7	11.6	
Direct Lending	2.3	2.3	3.9	7.4		
9% Annual	2.2	2.2	6.7	8.2		
Infrastructure	4.1	4.1	12.8			

1.2

1.2

5.7

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Current Allocation



Policy Index: 14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%. US Equity Blended: 80% Russell 1000, 20% Russell 2000.



CPI + 5%
Total Fund Executive Summary (Net of Fees)

	QTD	Fiscal YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs
Total Fund	1.8	6.3	7.7	4.5	9.2	5.3
Policy Index	1.0	4.2	8.2	5.3	8.6	5.7
US Equity	5.1	11.8	12.1	7.3	14.8	6.4
US Equity Blended	4.9	10.1	13.9	8.3	14.8	7.4
Russell 3000	4.2	8.8	12.7	8.4	14.7	7.1
International Equity	0.1	7.3	5.0	-1.3	6.2	1.5
MSCI ACWI ex USA Gross	-1.2	5.7	5.0	-1.3	5.5	1.4
US Fixed Income	-1.5	0.0	5.2	3.8	3.8	5.4
BBgBarc US Aggregate TR	-3.0	-2.5	2.6	3.0	2.2	4.3
Real Estate	0.1	0.5	6.6	14.5	9.3	
DJ US Select RESI	-2.5	-3.7	6.6	13.7	11.6	
Direct Lending	1.6	1.6	1.9	5.3		
9% Annual	2.2	2.2	6.7	8.2		
Infrastructure	-0.5	-0.5	4.1			
CPI + 5%	1.2	1.2	5.7			

Current Allocation



Policy Index: 14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%. US Equity Blended: 80% Russell 1000, 20% Russell 2000.



Total Fund Risk Analysis - 5 Years (Net of Fees)



Verus⁷⁷

Total Fund Performance Summary (Gross of Fees)

Period Ending: December 31, 2016

	Market Value	% of Portfolio	3 Mo	Fiscal YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	2016	2015	2014	2013	2012
Total Fund	1,859,742,905	100.0	1.9	6.5	8.2	4.9	9.6	5.7	8.2	-0.3	6.9	19.8	14.3
Policy Index			1.0	4.2	8.2	5.3	8.6	5.7	8.2	0.2	7.5	15.4	12.3
InvestorForce Public DB Gross Rank			5	3	31	33	12	23	31	61	23	12	10
US Equity	802,148,015	43.1	5.2	12.0	12.4	7.6	15.1	6.7	12.4	-0.2	10.9	36.9	18.8
US Equity Blended			4.9	10.1	13.9	8.3	14.8	7.4	13.9	-0.1	11.6	34.3	16.7
Russell 3000			4.2	8.8	12.7	8.4	14.7	7.1	12.7	0.5	12.6	33.6	16.4
InvestorForce All DB US Eq Gross Rank			25	11	58	59	15	71	58	63	54	13	6
Mellon S&P 500	93,182,114	5.0	3.8	7.8	12.0	8.9	14.7	7.0	12.0	1.4	13.7	32.4	16.0
S&P 500			3.8	7.8	12.0	8.9	14.7	6.9	12.0	1.4	13.7	32.4	16.0
eA US Large Cap Core Equity Gross Rank			49	48	31	32	35	68	31	41	42	58	40
BlackRock Russell 1000 Growth	90,073,255	4.8	1.0	5.7	7.2	8.6	14.6		7.2	5.7	13.1	33.5	15.4
Russell 1000 Growth			1.0	5.6	7.1	8.6	14.5		7.1	5.7	13.0	33.5	15.3
eA US Large Cap Growth Equity Gross Rank			39	47	26	24	35		26	42	37	56	53
Jackson Square	124,607,818	6.7	-4.0	3.1	-4.4	4.8	12.8	7.9	-4.4	5.9	13.8	35.6	17.0
Russell 1000 Growth			1.0	5.6	7.1	8.6	14.5	8.3	7.1	5.7	13.0	33.5	15.3
eA US Large Cap Growth Equity Gross Rank			96	81	98	89	78	58	98	39	32	39	36
BlackRock Russell 1000 Value	112,129,891	6.0	6.6	10.4	17.3	8.7	14.9		17.3	-3.6	13.5	32.6	17.6
Russell 1000 Value			6.7	10.4	17.3	8.6	14.8		17.3	-3.8	13.5	32.5	17.5
eA US Large Cap Value Equity Gross Rank			46	51	26	33	36		26	62	31	59	30
Dodge & Cox-Equity	193,876,391	10.4	10.5	20.1	21.4	9.0	17.1	6.6	21.4	-3.9	10.9	39.1	22.3
Russell 1000 Value			6.7	10.4	17.3	8.6	14.8	5.7	17.3	-3.8	13.5	32.5	17.5
eA US Large Cap Value Equity Gross Rank			6	4	6	25	5	56	6	64	72	15	3
Legato Capital	87,158,467	4.7	4.2	11.4	6.4	2.9	13.6		6.4	-0.7	3.0	47.3	18.1
Russell 2000 Growth			3.6	13.1	11.3	5.1	13.7		11.3	-1.4	5.6	43.3	14.6
eA US Small Cap Growth Equity Gross Rank			33	54	79	72	55		79	52	57	41	24
Capital Prospects	101,120,078	5.4	13.0	22.2	28.1	8.0	16.6		28.1	-7.0	5.8	37.9	23.8
Russell 2000 Value			14.1	24.2	31.7	8.3	15.1		31.7	-7.5	4.2	34.5	18.1
eA US Small Cap Value Equity Gross Rank			45	38	40	60	38		40	72	51	53	9

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Total Fund Performance Summary (Gross of Fees)

	Market Value	% of Portfolio	3 Mo	Fiscal YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	2016	2015	2014	2013	2012
International Equity	364,071,130	19.6	0.2	7.6	5.7	-0.8	6.7	2.0	5.7	-3.7	-4.2	20.0	18.0
MSCI ACWI ex USA Gross			-1.2	5.7	5.0	-1.3	5.5	1.4	5.0	-5.3	-3.4	15.8	17.4
InvestorForce All DB ex-US Eq Gross Rank			10	15	24	46	44	31	24	51	70	35	63
LSV Asset Mgt	184,601,275	9.9	2.5	11.6	8.8	-0.3	6.9	1.9	8.8	-5.1	-4.0	20.4	16.7
MSCI ACWI ex USA Gross			-1.2	5.7	5.0	-1.3	5.5	1.4	5.0	-5.3	-3.4	15.8	17.4
eA ACWI ex-US Equity Unhedged Gross Rank			6	4	10	48	62	75	10	86	65	46	78
Fidelity	179,469,855	9.7	-2.0	3.7	2.4	-1.4	6.5	2.2	2.4	-2.0	-4.5	19.6	19.3
MSCI ACWI ex USA Gross			-1.2	5.7	5.0	-1.3	5.5	1.4	5.0	-5.3	-3.4	15.8	17.4
eA ACWI ex-US Equity Unhedged Gross Rank			40	52	46	69	67	68	46	66	70	55	55
US Fixed Income	509,200,188	27.4	-1.4	0.1	5.4	3.9	4.0	5.6	5.4	0.3	6.2	0.3	7.9
BBgBarc US Aggregate TR			-3.0	-2.5	2.6	3.0	2.2	4.3	2.6	0.6	6.0	-2.0	4.2
InvestorForce All DB US Fix Inc Gross Rank			26	25	47	38	40	39	47	42	42	21	48
Dodge & Cox-Fixed	394,782,448	21.2	-1.2	0.5	5.9	4.1	4.3	5.7	5.9	0.2	6.5	0.9	8.4
BBgBarc US Aggregate TR			-3.0	-2.5	2.6	3.0	2.2	4.3	2.6	0.6	6.0	-2.0	4.2
eA US Core Fixed Inc Gross Rank			3	2	3	8	5	8	3	89	26	3	9
PIMCO	114,417,741	6.2	-2.3	-1.4	3.7	3.2	2.6		3.7	0.9	5.0	-2.2	5.8
BBgBarc US Aggregate TR			-3.0	-2.5	2.6	3.0	2.2		2.6	0.6	6.0	-2.0	4.2
eA US Core Fixed Inc Gross Rank			14	15	29	71	71		29	49	83	89	54
Real Estate	78,933,928	4.2	0.4	0.8	7.5	15.7	10.6		7.5	12.1	28.3	1.4	5.6
DJ US Select RESI			-2.5	-3.7	6.6	13.7	11.6		6.6	4.5	31.9	1.3	16.1
Prime Property Fund	16,890,251	0.9	2.6	5.2	10.4				10.4				
NCREIF-ODCE			2.1	4.2	8.8				8.8				
American Strategic Value Realty	18,851,824	1.0	3.4	5.7	13.1				13.1	21.4			
NCREIF Property Index			1.7	3.5	8.0				8.0	13.3			
BlackRock US Real Estate	30,015,945	1.6	-2.5	-3.7	6.6	13.7			6.6	4.4	31.9	1.4	
DJ US Select RESI TR USD			-2.5	-3.7	6.6	13.7			6.6	4.5	31.9	1.3	
eA US REIT Gross Rank			44	56	68	55			68	58	39	91	

Verus⁷⁷

Total Fund Performance Summary (Net of Fees)

Period Ending: December 31, 2016

	Market Value	% of Portfolio	3 Mo	Fiscal YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	2016	2015	2014	2013	2012	Return	Since
Total Fund	1,859,742,905	100.0	1.8	6.3	7.7	4.5	9.2	5.3	7.7	-0.6	6.5	19.2	14.0	9.0	Dec-94
Policy Index			1.0	4.2	8.2	5.3	8.6	5.7	8.2	0.2	7.5	15.4	12.3	8.0	Dec-94
US Equity	802,148,015	43.1	5.1	11.8	12.1	7.3	14.8	6.4	12.1	-0.4	10.7	36.5	18.5	6.5	Jun-01
US Equity Blended			4.9	10.1	13.9	8.3	14.8	7.4	13.9	-0.1	11.6	34.3	16.7	6.7	Jun-01
Russell 3000			4.2	8.8	12.7	8.4	14.7	7.1	12.7	0.5	12.6	33.6	16.4	6.5	Jun-01
Mellon S&P 500	93,182,114	5.0	3.8	7.8	11.9	8.9	14.7	6.9	11.9	1.4	13.7	32.4	16.0	9.0	Apr-03
S&P 500			3.8	7.8	12.0	8.9	14.7	6.9	12.0	1.4	13.7	32.4	16.0	9.0	Apr-03
BlackRock Russell 1000 Growth	90,073,255	4.8	1.0	5.7	7.2	8.6	14.5		7.2	5.7	13.1	33.5	15.4	15.6	Jun-10
Russell 1000 Growth			1.0	5.6	7.1	8.6	14.5		7.1	5.7	13.0	33.5	15.3	15.5	Jun-10
Jackson Square	124,607,818	6.7	-4.2	2.8	-4.9	4.4	12.4	7.4	-4.9	5.5	13.4	34.9	16.6	7.9	Aug-06
Russell 1000 Growth			1.0	5.6	7.1	8.6	14.5	8.3	7.1	5.7	13.0	33.5	15.3	8.9	Aug-06
BlackRock Russell 1000 Value	112,129,891	6.0	6.6	10.4	17.3	8.6	14.9		17.3	-3.6	13.5	32.6	17.6	14.1	Jul-09
Russell 1000 Value			6.7	10.4	17.3	8.6	14.8		17.3	-3.8	13.5	32.5	17.5	13.9	Jul-09
Dodge & Cox-Equity	193,876,391	10.4	10.4	20.0	21.2	8.8	16.9	6.4	21.2	-4.0	10.7	38.8	22.1	12.2	Dec-94
Russell 1000 Value			6.7	10.4	17.3	8.6	14.8	5.7	17.3	-3.8	13.5	32.5	17.5	10.1	Dec-94
Legato Capital	87,158,467	4.7	3.8	10.6	4.8	1.8	12.6		4.8	-1.8	2.5	46.0	17.4	14.8	Dec-08
Russell 2000 Growth			3.6	13.1	11.3	5.1	13.7		11.3	-1.4	5.6	43.3	14.6	15.7	Dec-08
Capital Prospects	101,120,078	5.4	12.6	21.3	26.2	6.9	15.6		26.2	-7.9	5.2	36.8	23.2	15.7	Dec-08
Russell 2000 Value			14.1	24.2	31.7	8.3	15.1		31.7	-7.5	4.2	34.5	18.1	14.0	Dec-08
International Equity	364,071,130	19.6	0.1	7.3	5.0	-1.3	6.2	1.5	5.0	-4.0	-4.5	19.4	17.5	4.9	Jun-01
MSCI ACWI ex USA Gross			-1.2	5.7	5.0	-1.3	5.5	1.4	5.0	-5.3	-3.4	15.8	17.4	5.6	Jun-01
LSV Asset Mgt	184,601,275	9.9	2.3	11.3	8.2	-0.7	6.4	1.4	8.2	-5.4	-4.2	19.8	16.2	6.0	Aug-04
MSCI ACWI ex USA Gross			-1.2	5.7	5.0	-1.3	5.5	1.4	5.0	-5.3	-3.4	15.8	17.4	6.0	Aug-04
Fidelity	179,469,855	9.7	-2.1	3.5	1.8	-1.8	6.0	1.7	1.8	-2.3	-4.9	19.1	18.8	2.4	Apr-06
MSCI ACWI ex USA Gross			-1.2	5.7	5.0	-1.3	5.5	1.4	5.0	-5.3	-3.4	15.8	17.4	2.3	Apr-06
US Fixed Income	509,200,188	27.4	-1.5	0.0	5.2	3.8	3.8	5.4	5.2	0.2	6.1	0.1	7.7	5.7	Jun-01
BBgBarc US Aggregate TR			-3.0	-2.5	2.6	3.0	2.2	4.3	2.6	0.6	6.0	-2.0	4.2	4.7	Jun-01
Dodge & Cox-Fixed	394,782,448	21.2	-1.2	0.4	5.7	4.1	4.2	5.6	5.7	0.1	6.4	0.8	8.3	6.8	Dec-94
BBgBarc US Aggregate TR			-3.0	-2.5	2.6	3.0	2.2	4.3	2.6	0.6	6.0	-2.0	4.2	5.8	Dec-94
PIMCO	114,417,741	6.2	-2.4	-1.6	3.4	2.9	2.3		3.4	0.6	4.7	-2.5	5.5	3.5	May-10
BBgBarc US Aggregate TR			-3.0	-2.5	2.6	3.0	2.2		2.6	0.6	6.0	-2.0	4.2	3.3	May-10

Total Fund Performance Summary (Net of Fees)

Period Ending: December 31, 2016

	Market Value	% of Portfolio	3 Mo	Fiscal YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	2016	2015	2014	2013	2012	Return	Since
Real Estate	78,933,928	4.2	0.1	0.5	6.6	14.5	9.3		6.6	10.5	27.4	1.3	2.7	2.8	Feb-08
DJ US Select RESI			-2.5	-3.7	6.6	13.7	11.6		6.6	4.5	31.9	1.3	16.1	5.5	Feb-08
Prime Property Fund	16,890,251	0.9	2.4	4.7	9.2				9.2					10.0	Sep-15
NCREIF-ODCE			2.1	4.2	8.8				8.8					9.8	Sep-15
American Strategic Value Realty	18,851,824	1.0	3.0	5.3	11.7				11.7	18.3				15.0	Dec-14
NCREIF Property Index			1.7	3.5	8.0				8.0	13.3				10.6	Dec-14
BlackRock US Real Estate	30,015,945	1.6	-2.6	-3.8	6.6	13.6			6.6	4.4	31.9	1.3		10.4	Sep-12
DJ US Select RESI TR USD			-2.5	-3.7	6.6	13.7			6.6	4.5	31.9	1.3		10.4	Sep-12



Verus Internal Analysis										
Inception Date	Manager Name/Fund Name	Estimated Market Value as of 12/31/16 ³	Total Commitment	Capital Called	% Called	Remaining Commitment	Total Distributions	Distrib./ Paid-In (DPI) ¹	Tot. Value/ Paid-In (TVPI) ²	Latest Valuation
Real Estate							-		_	
07/31/2014	Greenfield Gap	\$13,175,908	\$15,000,000	\$11,021,141	73%	\$3,978,859	\$0	0.0%	119.6%	09/30/2016
	Total Real Estate	\$13,175,908	\$15,000,000	\$11,021,141	73%	\$3,978,859	\$0	0.0%	119.6%	
	% of Portfolio (Market Value)	0.7%								
Direct Lend	ing									
05/31/2013	Medley Capital	\$23,924,172	\$30,000,000	\$29,000,453	97%	\$999,547	\$14,682,600	50.6%	133.1%	09/30/2016
05/31/2013	Raven Capital	\$18,728,840	\$40,000,000	\$34,505,763	86%	\$5,494,237	\$18,418,764	53.4%	107.7%	09/30/2016
07/31/2015	Raven Opportunity III	\$13,062,471	\$50,000,000	\$13,662,438	27%	\$36,337,562	\$5,182,527	37.9%	133.5%	09/30/2016
08/31/2013	White Oak Pinnacle	\$36,053,251	\$40,000,000	\$40,000,000 4	100%	\$4,494,049	\$15,727,174	39.3%	129.5%	09/30/2016
	Total Direct Lending	\$91,768,734	\$160,000,000	\$117,168,654	73%	\$47,325,395	\$54,011,065	46.1%	124.4%	
	% of Portfolio (Market Value)	4.9%								
Infrastructu	re						-			
05/31/2015	MS Infrastructure Partners II	\$11,498,788	\$50,000,000	\$12,274,625	25%	\$37,725,375	\$1,295,430	10.6%	104.2%	09/30/2016
	Total Infrastructure	\$11,498,788	\$50,000,000	\$12,274,625	25%	\$37,725,375	\$1,295,430	10.6%	104.2%	
	% of Portfolio (Market Value)	0.6%								

1 (DPI) is equal to (capital returned / capital called) 2 (TVPI) is equal to (market value + capital returned) / capital called

3 Last known market value + capital calls - distributions

4 Includes deemed contributions, which are amounts withheld from distributions and applied to fulfill capital calls.

Verus77

Real Estate	Inception	Fund Level (G)	StanCERA (G)	Fund Level (N)	StanCERA (N)	IRR Date
Greenfield Gap	07/31/2014	17.6%	19.8%	14.0%	13.6%	09/30/2016
Direct Lending						
Medley Capital	05/31/2013	8.7%	7.0%	6.8%	5.0%	09/30/2016
Raven Capital	05/31/2013	7.2%	7.2%	3.5%	3.5%	09/30/2016
Raven Opportunity III	07/31/2015	13.7%	13.7%	-5.4%	-5.4%	09/30/2016
White Oak Pinnacle	08/31/2013	14.5%	15.2%	9.0%	9.4%	09/30/2016
Infrastructure						
MS Infrastructure Partners II	05/31/2015	10.4%	9.6%	-2.6%	-6.5%	09/30/2016

IRR information provided by managers.



Total Fund Performance Analysis - 3 and 5 Years (Net of Fees)

Period Ending: December 31, 2016

3 Years											
	Anlzd Ret	Ann Excess BM Return	Anlzd Std Dev	Anlzd Alpha	Beta	Tracking Error	R-Squared	Sharpe Ratio	Info Ratio	Up Mkt Cap Ratio	Down Mkt Cap Ratio
Mellon S&P 500	8.87%	0.00%	6.80%	0.00%	1.00	0.03%	1.00	1.29	-0.12	99.91%	99.75%
BlackRock Russell 1000 Growth	8.60%	0.05%	6.56%	0.04%	1.00	0.05%	1.00	1.29	0.94	100.52%	100.07%
Jackson Square	4.41%	-4.14%	10.62%	-7.77%	1.42	5.79%	0.77	0.40	-0.72	64.60%	136.05%
BlackRock Russell 1000 Value	8.64%	0.05%	8.21%	0.10%	0.99	0.07%	1.00	1.04	0.75	100.09%	98.83%
Dodge & Cox-Equity	8.81%	0.23%	10.11%	-0.30%	1.06	5.08%	0.75	0.86	0.05	104.86%	107.58%
Legato Capital	1.81%	-3.24%	13.23%	-3.10%	0.97	3.02%	0.95	0.13	-1.07	80.32%	109.39%
Capital Prospects	6.94%	-1.37%	12.51%	-0.39%	0.88	2.66%	0.97	0.54	-0.52	84.32%	91.25%
LSV Asset Mgt	-0.67%	0.65%	11.61%	0.78%	1.10	2.82%	0.95	-0.07	0.23	114.37%	102.19%
Fidelity	-1.84%	-0.51%	9.43%	-0.66%	0.89	2.58%	0.94	-0.21	-0.20	84.81%	95.46%
Dodge & Cox-Fixed	4.05%	1.02%	2.86%	1.95%	0.69	1.84%	0.73	1.37	0.55	97.89%	39.36%
PIMCO	2.90%	-0.13%	3.04%	0.32%	0.85	0.71%	0.97	0.91	-0.18	87.99%	77.07%
BlackRock US Real Estate	13.60%	-0.07%	13.49%	-0.06%	1.00	0.05%	1.00	1.00	-1.40	99.66%	100.24%

5 Years

	AnIzd Ret	Ann Excess BM Return	Anlzd Std Dev	Anlzd Alpha	Beta	Tracking Error	R-Squared	Sharpe Ratio	Info Ratio	Up Mkt Cap Ratio	Down Mkt Cap Ratio
Mellon S&P 500	14.65%	-0.01%	9.11%	0.01%	1.00	0.02%	1.00	1.60	-0.36	99.86%	99.65%
BlackRock Russell 1000 Growth	14.55%	0.05%	9.84%	0.05%	1.00	0.05%	1.00	1.47	1.01	100.32%	99.67%
Jackson Square	12.36%	-2.14%	12.86%	-5.53%	1.23	4.83%	0.89	0.95	-0.44	87.59%	121.12%
BlackRock Russell 1000 Value	14.85%	0.05%	9.52%	0.08%	1.00	0.06%	1.00	1.55	0.91	100.21%	99.04%
Dodge & Cox-Equity	16.90%	2.10%	11.07%	0.99%	1.07	4.23%	0.86	1.52	0.50	119.26%	108.39%
Legato Capital	12.57%	-1.17%	14.05%	-1.15%	1.00	2.91%	0.96	0.89	-0.40	92.17%	100.83%
Capital Prospects	15.56%	0.49%	12.68%	1.11%	0.96	3.01%	0.95	1.22	0.16	100.85%	94.21%
LSV Asset Mgt	6.39%	0.91%	12.91%	0.50%	1.07	2.39%	0.97	0.49	0.38	113.09%	103.68%
Fidelity	6.00%	0.51%	11.38%	0.83%	0.94	2.34%	0.96	0.52	0.22	97.44%	91.11%
Dodge & Cox-Fixed	4.23%	2.00%	2.79%	2.64%	0.71	1.88%	0.65	1.48	1.06	122.96%	27.38%
PIMCO	2.31%	0.08%	3.09%	0.19%	0.95	0.72%	0.95	0.72	0.11	98.10%	91.33%

Performance Analysis excludes closed end funds and those funds without 3 and 5 years of performance.

Verus⁷⁷

Total Fund Investment Fund Fee Analysis

Period Ending: December 31, 2016

Name	Asset Class	Fee Schedule	Market Value	Estimated Fee Value	Estimated Fee
Mellon S&P 500	Domestic Equity	0.04% of Assets	\$93,182,114	\$32,614	0.04%
BlackRock Russell 1000 Growth	Domestic Equity	0.02% of Assets	\$90,073,255	\$18,015	0.02%
Jackson Square	Domestic Equity	0.50% of First \$100.0 Mil, 0.45% Thereafter	\$124,607,818	\$610,735	0.49%
BlackRock Russell 1000 Value	Domestic Equity	0.02% of Assets	\$112,129,891	\$22,426	0.02%
Dodge & Cox-Equity	Domestic Equity	0.40% of First \$10.0 Mil, 0.20% of Next \$90.0 Mil, 0.15% Thereafter	\$193,876,391	\$360,815	0.19%
Legato Capital		0.77% of Assets	\$87,158,467	\$671,120	0.77%
Capital Prospects		0.75% of Assets	\$101,120,078	\$758,401	0.75%
LSV Asset Mgt	International Equity	0.75% of First \$25.0 Mil, 0.65% of Next \$25.0 Mil, 0.55% of Next \$50.0 Mil, 0.45% Thereafter	\$184,601,275	\$1,005,706	0.54%
Fidelity	International Equity	0.25% of Assets	\$179,469,855	\$448,675	0.25%
Dodge & Cox-Fixed	Domestic Fixed Income	0.40% of First \$4.0 Mil, 0.30% of Next \$6.0 Mil, 0.20% of Next \$10.0 Mil, 0.10% Thereafter	\$394,782,448	\$428,782	0.11%
PIMCO	Domestic Fixed Income	0.50% of First \$25.0 Mil, 0.38% of Next \$25.0 Mil, 0.25% Thereafter	\$114,417,741	\$379,794	0.33%
Prime Property Fund	Real Estate	0.84% of Assets	\$16,890,251	\$141,878	0.84%
American Strategic Value Realty	Real Estate	1.25% of First \$10.0 Mil, 1.20% of Next \$15.0 Mil, 1.10% of Next \$25.0 Mil, 1.00% Thereafter	\$18,851,824	\$231,222	1.23%
BlackRock US Real Estate	Real Estate	0.09% of First \$100.0 Mil, 0.07% Thereafter	\$30,015,945	\$27,014	0.09%
Cash Account	Cash and Equivalents	0.10% of Assets	\$2,122,122	\$2,122	0.10%
Total			\$1,743,299,475	\$5,139,319	0.29%

Closed end funds excluded from fee analysis. Fidelity has performance based fees which are not included in the analysis above; fee shown is the annual base fee only.







5th Percentile

of Portfolios

Policy Index

Total Fund

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Median



Total Fund Consecutive Periods vs. InvestorForce Public DB Gross

Verus⁷⁷

5th Percentile

25th Percentile

75th Percentile

95th Percentile

of Portfolios

Policy Index

Total Fund

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Median

Domestic Equity Managers

Mellon S&P 500 Manager Portfolio Overview

Characteristics

	Portfolio	S&P 500
Number of Holdings	500	505
Weighted Avg. Market Cap. (\$B)	139.12	138.54
Median Market Cap. (\$B)	18.81	18.83
Price To Earnings	23.10	22.27
Price To Book	4.67	4.38
Price To Sales	3.51	3.34
Return on Equity (%)	20.83	18.52
Yield (%)	2.10	2.10
Beta	1.00	1.00



Top Contributors

Bottom Contributors

Larges	t Holdings	
	End Weight	Return
APPLE	3.21	2.98
MICROSOFT	2.51	8.60
ALPHABET 'C'	2.41	-0.70
EXXON MOBIL	1.94	4.32
JOHNSON & JOHNSON	1.63	-1.80
BERKSHIRE HATHAWAY 'B'	1.61	12.81
JP MORGAN CHASE & CO.	1.60	30.52
AMAZON.COM	1.53	-10.44
GENERAL ELECTRIC	1.45	7.49
FACEBOOK CLASS A	1.40	-10.31

	Avg Wgt	Return	Contribution	
JP MORGAN CHASE & CO.	1.39	30.52	0.42	AMAZ FACE
BANK OF AMERICA	0.97	41.72	0.40	MEDT
WELLS FARGO & CO	1.16	25.50	0.30	AMGE
MICROSOFT	2.47	8.60	0.21	PROC
CITIGROUP	0.79	26.25	0.21	CVS H
BERKSHIRE HATHAWAY 'B'	1.51	12.81	0.19	GILEA
GOLDMAN SACHS GP.	0.38	48.93	0.18	MERC
CHEVRON	1.07	15.50	0.17	
NVIDIA	0.22	56.01	0.13	GROU
UNITEDHEALTH GROUP	0.74	14.77	0.11	

n	Avg Wgt	Return	Contribution
AMAZON.COM	1.67	-10.44	-0.17
FACEBOOK CLASS A	1.57	-10.31	-0.16
MEDTRONIC	0.60	-17.06	-0.10
AMGEN	0.60	-11.75	-0.07
PROCTER & GAMBLE	1.24	-5.58	-0.07
CVS HEALTH	0.48	-10.90	-0.05
GILEAD SCIENCES	0.53	-8.92	-0.05
VISA 'A'	0.82	-5.46	-0.04
MERCK & COMPANY	0.90	-4.95	-0.04
SIMON PROPERTY GROUP	0.32	-13.41	-0.04

Unclassified sector allocation includes cash allocations.





Rolling Annualized Excess Performance





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Rolling 3 Year Annualized Return (%)





Mellon S&P 500 Risk vs. Return 3 & 5 Year (Gross of Fees)



Verus⁷⁷

BlackRock Russell 1000 Growth Manager Portfolio Overview

Russell Portfolio 1000 Growth Number of Holdings 604 606 Weighted Avg. Market Cap. (\$B) 136.91 136.85 Median Market Cap. (\$B) 8.78 8.78 Price To Earnings 25.82 25.17 Price To Book 6.91 6.64 Price To Sales 4.52 3.52 Return on Equity (%) 28.24 25.80 Yield (%) 1.59 1.59 Beta 1.00 1.00

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Characteristics



Sector Allocation (%) vs Russell 1000 Growth

-		A 11 A	
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A 10 A

Largest Holdings I op Contributor		ors	Bottom Contributors							
	End Weight	Return		Avg Wgt	Return	Contributio	n	Avg Wgt	Return	Contribution
APPLE	5.53	2.98	MICROSOFT	4.31	8.60	0.37	AMAZON.COM	2.96	-10.44	-0.31
MICROSOFT	4.48	8.60	NVIDIA	0.38	56.01	0.21	FACEBOOK CLASS A	2.72	-10.31	-0.28
AMAZON.COM	2.77	-10.44	UNITEDHEALTH GROUP	1.32	14.77	0.19	AMGEN	1.09	-11.75	-0.13
FACEBOOK CLASS A	2.45	-10.31	WALT DISNEY	1.48	13.08	0.19	CVS HEALTH	0.81	-10.90	-0.09
ALPHABET 'A'	2.21	-1.44	APPLE	5.42	2.98	0.16	GILEAD SCIENCES	0.96	-8.92	-0.09
ALPHABET 'C'	2.18	-0.70	BOEING	0.81	19.08	0.15	VISA 'A'	1.48	-5.46	-0.08
WALT DISNEY	1.61	13.08	NETFLIX	0.44	25.62	0.11	SIMON PROPERTY	0.51	-13/1	-0.07
HOME DEPOT	1.59	4.75	ALTRIA GROUP	1.21	7.91	0.10	GROUP	0.01	-10.41	-0.07
COMCAST 'A'	1.46	4.93	TIME WARNER	0.43	21.78	0.09	ILLUMINA	0.21	-29.52	-0.06
UNITEDHEALTH GROUP	1.43	14.77	CELGENE	0.80	10.73	0.09	BIOGEN	0.62	-9.41	-0.06
							ELI LILLY	0.69	-7.76	-0.05

Unclassified sector allocation includes cash allocations.

BlackRock Russell 1000 Growth Manager Performance Comparisons (Gross of Fees)



Rolling Annualized Excess Performance

BlackRock Russell 1000 Growth vs. eA US Large Cap Growth Equity Gross Universe



Verus⁷⁷



Rolling 3 Year Annualized Return (%)

- BlackRock Russell 1000 Growth - Russell 1000 Growth





BlackRock Russell 1000 Growth Risk vs. Return 3 & 5 Year (Gross of Fees)



3 Years

7.2%

11.7%

0.6

eA US Large Cap Growth Equity Gross Median

5 Years

Verus⁷⁷

eA US Large Cap Growth Equity Gross Median

11.5%

1.2

13.9%

Jackson Square Manager Portfolio Overview

Characteristics

Russell 1000

Portfolio

		Growth
Number of Holdings	31	606
Weighted Avg. Market Cap. (\$B)	103.38	136.85
Median Market Cap. (\$B)	32.24	8.78
Price To Earnings	30.59	25.17
Price To Book	6.51	6.64
Price To Sales	6.84	3.52
Return on Equity (%)	21.86	25.80
Yield (%)	1.07	1.59
Beta	1.42	1.00



Largest H	loldings		Top Contributors			Bo	ors			
	End Weight	Return		Avg Wgt	Return	Contribution		Avg Wgt	Return	Contribution
MICROSOFT	6.20	8.60	CELGENE	5.26	10.73	0.56	TRIPADVISOR 'A'	2.93	-26.61	-0.78
VISA 'A'	5.75	-5.46	MICROSOFT	5.16	8.60	0.44	NIELSEN	2.27	-21.12	-0.48
CELGENE	5.71	10.73	INTERCONTINENTAL EX.	3.59	5.03	0.18	FACEBOOK CLASS A	4.18	-10.31	-0.43
PAYPAL HOLDINGS	5.50	-3.66	CHARLES SCHWAB	0.62	25.28	0.16	EBAY	4.03	-9.76	-0.39
MASTERCARD	4.68	1.64	DOLLAR GENERAL	1.53	6.18	0.09	ALLERGAN	4.14	-8.60	-0.36
CROWN CASTLE INTL.	4.52	-6.88	INTUIT	1.99	4.51	0.09	VISA 'A'	5.85	-5.46	-0.32
LIBERTY INTACT.QVC GROUP 'A'	4.25	-0.15	MASTERCARD	4.61	1.64	0.08	CROWN CASTLE INTL.	4.57	-6.88	-0.31
ALLERGAN	4.20	-8.60	WALGREENS BOOTS	1.80	3 1 2	0.06	ELECTRONIC ARTS	3.94	-7.78	-0.31
EBAY	4.18	-9.76	ALLIANCE	1.00	5.12	0.00	QUALCOMM	5.27	-4.07	-0.21
ELECTRONIC ARTS	3.90	-7.78	EQUINIX	2.30	-0.26	-0.01	PAYPAL HOLDINGS	5.55	-3.66	-0.20
			LIBERTY INTACT.QVC GROUP 'A'	4.12	-0.15	-0.01				

Unclassified sector allocation includes cash allocations.



Rolling Annualized Excess Performance

45.0 40.0 35.0 Annualized Return (%) 30.0 25.0 20.0 15.0 10.0 5.0 0.0 -5.0 2016 1 Year 10 Years 2015 2014 2013 2012 Quarter 3 Years 5 Years Return (Rank) 12.0 21.6 **5th Percentile** 4.2 12.0 10.1 16.6 10.1 11.6 17.3 42.8 2.0 7.3 25th Percentile 7.3 8.8 7.6 14.3 37.3 18.2 8.6 15.0 0.2 4.6 7.2 13.9 8.1 4.6 4.7 12.0 34.3 15.7 75th Percentile -1.2 1.8 6.0 13.0 7.2 1.8 2.1 9.5 31.0 13.4 -2.7 95th Percentile -4.0 -2.7 3.4 11.2 6.1 -2.4 5.8 26.6 10.2 # of Portfolios 282 282 280 264 227 282 270 291 274 274 **Jackson Square** -4.0 (96) -4.4 (98) 4.8 (89)12.8 (78) 7.9 (58) -4.4 (98) 5.9 (39) 13.8 (32)35.6 (39)17.0 (36)Russell 1000 Growth 1.0 (39) 7.1 (26) 8.6 (26) 14.5 (37) 8.3 (44) 7.1 (26) 5.7 (42) 13.0 (38) 33.5 (56) 15.3 (55)

Jackson Square vs. eA US Large Cap Growth Equity Gross Universe

Verus⁷⁷

Median

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Rolling 3 Year Annualized Return (%)







Jackson Square Risk vs. Return 3 & 5 Year (Gross of Fees)



5 Years

Verus⁷⁷

BlackRock Russell 1000 Value Manager Portfolio Overview

Characteristics

	Portfolio	Russell 1000 Value
Number of Holdings	694	696
Weighted Avg. Market Cap. (\$B)	113.99	113.99
Median Market Cap. (\$B)	7.99	7.99
Price To Earnings	20.85	19.78
Price To Book	2.40	2.39
Price To Sales	2.59	2.81
Return on Equity (%)	13.14	11.64
Yield (%)	2.46	2.44
Beta	0.99	1.00



Sector Allocation (%) vs Russell 1000 Value

Ton	Contributoro	
TOP	Contributors	

Russell 1000 Value

Laigoot Holaingo				
	End Weight	Return		
EXXON MOBIL	3.42	4.32		
JP MORGAN CHASE & CO.	2.85	30.52		
BERKSHIRE HATHAWAY 'B'	2.80	12.81		
AT&T	2.38	6.01		
JOHNSON & JOHNSON	2.38	-1.80		
WELLS FARGO & CO	2.29	25.50		
GENERAL ELECTRIC	2.13	7.49		
BANK OF AMERICA	2.06	41.72		
CHEVRON	2.01	15.50		
PROCTER & GAMBLE	1.95	-5.58		

Largest Holdings

	Avg Wgt	Return	Contributi
JP MORGAN CHASE & CO.	2.50	30.52	0.76
BANK OF AMERICA	1.74	41.72	0.73
WELLS FARGO & CO	2.08	25.50	0.53
CITIGROUP	1.42	26.25	0.37
BERKSHIRE HATHAWAY 'B'	2.68	12.81	0.34
GOLDMAN SACHS GP.	0.68	48.93	0.34
CHEVRON	1.91	15.50	0.30
MORGAN STANLEY	0.48	32.56	0.16
GENERAL ELECTRIC	2.11	7.49	0.16
EXXON MOBIL	3.42	4.32	0.15

on		Avg Wgt	Return	Contribution
	MEDTRONIC	1.08	-17.06	-0.18
	PROCTER & GAMBLE	2.14	-5.58	-0.12
	MERCK & COMPANY	1.61	-4.95	-0.08
	PHILIP MORRIS INTL.	1.24	-4.81	-0.06
	CISCO SYSTEMS	1.48	-3.94	-0.06
	PFIZER	1.73	-3.14	-0.05
	COLGATE-PALM.	0.48	-11.25	-0.05
	ABBOTT LABORATORIES	0.56	-8.60	-0.05
	INTEL	1.47	-3.18	-0.05
	JOHNSON & JOHNSON	2.50	-1.80	-0.04

Bottom Contributors

Unclassified sector allocation includes cash allocations.



BlackRock Russell 1000 Value Manager Performance Comparisons (Gross of Fees)

Verus⁷⁷

Stanislaus County Employees' Retirement Association

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Rolling Annualized Excess Performance

BlackRock Russell 1000 Value vs. eA US Large Cap Value Equity Gross Universe





Rolling 3 Year Annualized Return (%)

- BlackRock Russell 1000 Value ---- Russell 1000 Value





BlackRock Russell 1000 Value Risk vs. Return 3 & 5 Year (Gross of Fees)



Dodge & Cox-Equity Manager Portfolio Overview

Characteristics

	Portfolio	Russell 1000 Value
Number of Holdings	67	696
Weighted Avg. Market Cap. (\$B)	106.73	113.99
Median Market Cap. (\$B)	38.97	7.99
Price To Earnings	18.22	19.78
Price To Book	2.92	2.39
Price To Sales	2.55	2.81
Return on Equity (%)	12.83	11.64
Yield (%)	1.75	2.44
Beta	1.06	1.00



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Rottom	Contribute	re
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Large	Largest Holdings			
	End Weight			
BANK OF AMERICA	3.97			
WELLS FARGO & CO	3.84			
CAPITAL ONE FINL.	3.83			
CHARLES SCHWAB	3.75			
HEWLETT PACKARD ENTER.	3.29			
GOLDMAN SACHS GP.	3.15			
TIME WARNER	3.08			
CHARTER COMMS.CL.A	2.97			
COMCAST 'A'	2.83			
SANOFI ADR 2:1	2.81			

l op Contributors					
Return		Avg Wgt	Return	Contribution	
41.72	BANK OF AMERICA	3.96	41.72	1.65	ASTRAZENECA
25.50	GOLDMAN SACHS GP.	2.62	48.93	1.28	SPN.ADR.2:1
22.09	WELLS FARGO & CO	3.48	25.50	0.89	NOVARTIS 'B' SPN.AI
25.28	CHARLES SCHWAB	3.51	25.28	0.89	
2.24	CAPITAL ONE FINL.	3.80	22.09	0.84	MEDIRONIC
48.93	TIME WARNER	3.26	21.78	0.71	ALNYLAM PHARMACEUTICALS
21.78	JP MORGAN CHASE &	2.14	30.52	0.65	CISCO SYSTEMS
6.65 4.93	BAKER HUGHES	1.86	29.13	0.54	HEWLETT-PACKARD
5.89	BANK OF NEW YORK MELLON	2.50	19.33	0.48	SYMANTEC
	METLIFE	2.03	22.32	0.45	EXPRESS SCRIPTS HOLDING

۱		Avg Wgt	Return	Contribution
	ASTRAZENECA SPN.ADR.2:1	1.37	-16.86	-0.23
	NOVARTIS 'B' SPN.ADR 1:1	2.62	-7.75	-0.20
	MEDTRONIC	0.89	-17.06	-0.15
	ALNYLAM PHARMACEUTICALS	0.30	-44.76	-0.13
	CISCO SYSTEMS	2.08	-3.94	-0.08
	HEWLETT-PACKARD	1.97	-3.64	-0.07
	WAL MART STORES	1.71	-3.48	-0.06
	SYMANTEC	0.97	-4.52	-0.04
	EXPRESS SCRIPTS HOLDING	1.57	-2.47	-0.04
	CONCHO RESOURCES	0.82	-3.46	-0.03

Unclassified sector allocation includes cash allocations.





Rolling Annualized Excess Performance



Dodge & Cox-Equity vs. eA US Large Cap Value Equity Gross Universe

Verus⁷⁷

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Median



Rolling 3 Year Annualized Return (%)

---- Dodge & Cox-Equity ----- Russell 1000 Value





Dodge & Cox-Equity Risk vs. Return 3 & 5 Year (Gross of Fees)

3 Years

5 Years



Legato Capital Manager Portfolio Overview

Characteristics

	Portfolio	2000 Growth
Number of Holdings	237	1,177
Weighted Avg. Market Cap. (\$B)	2.46	2.16
Median Market Cap. (\$B)	2.33	0.85
Price To Earnings	32.69	28.99
Price To Book	5.18	4.81
Price To Sales	4.02	2.67
Return on Equity (%)	14.87	15.04
Yield (%)	0.41	0.61
Beta	0.97	1.00



0.61

33.45

Largest Holdings			Top Contributors		
	End Weight	Return		Avg Wgt	Return
STAMPS.COM	2.29	21.31	LIFELOCK	2.28	41.37
LIGAND PHARMS.'B'	1.80	-0.44	STAMPS.COM	2.09	21.31
INC RESEARCH HOLDINGS CL.A	1.71	17.99	DAVE & BUSTER'S ENTM.	1.00	43.70
ECHO GLOBAL LOGISTICS	1.66	8.63	INC RESEARCH	1 50	17 00
DAVE & BUSTER'S ENTM.	1.46	43.70	HOLDINGS CL.A	1.00	17.55
SYNCHRONOSS TECHNOLOGIES	1.40	-6.99	BLACKHAWK NETWORK HDG.	1.04	24.88
POOL	1.29	10.75	BANK OF THE OZARKS	0.69	37.54
CRITEO ADR 1:1	1.22	17.00	TETRA TECH	1.00	21.91
BLACKHAWK NETWORK HDG.	1.19	24.88	MICROSEMI	0.75	28.56
NEXSTAR BCAST.GP.	1.18	10.24	CARDTRONICS	0.92	22.35

TEAM HEALTH HOLDINGS

Russell

Contribution		Avg Wgt	Return	Contribution	
0.94	ADVISORY BOARD	0.78	-25.68	-0.20	
0.45	NEKTAR THERAPEUTICS	0.68	-28.58	-0.19	
0.43	NEVRO	0.57	-30.40	-0.17	
0.27	PAYLOCITY HOLDING	0.53	-32.50	-0.17	
0.21	OPHTHOTECH	0.15	-89.53	-0.14	
0.26	SYNCHRONOSS TECHNOLOGIES	1.84	-6.99	-0.13	
0.26	SHUTTERSTOCK	0.49	-25.40	-0.12	
0.22	IGI LABORATORIES	0.91	-13.03	-0.12	
0.21	BROADSOFT	1.01	-11.39	-0.11	
0.21	RADIUS HEALTH	0.36	-29.69	-0.11	
0.20					

Bottom Contributors

Unclassified sector allocation includes cash allocations.





Rolling Annualized Excess Performance





Verus⁷⁷

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Rolling 3 Year Annualized Return (%)

- Legato Capital - Russell 2000 Growth






Legato Capital Risk vs. Return 3 & 5 Year (Gross of Fees)

15.0 20.0 10.0 15.0 Legato Capital Russell 2000 Growth Russell 2000 Growth 5.0 Legato Capital Annualized Return Annualized Return **164 Portfolios 155 Portfolios** 0.0 10.0 -5.0 . 5.0 -10.0 -15.0 0.0 5.0 15.0 0.0 10.0 20.0 25.0 0.0 5.0 10.0 15.0 20.0 25.0 Annualized Standard Deviation Annualized Standard Deviation 3 Years 5 Years Anlzd Standard Anlzd Standard Anlzd Return Sharpe Ratio Anlzd Return Sharpe Ratio Deviation Deviation Legato Capital 2.9% 13.1% 0.2 Legato Capital 13.6% 14.0% 1.0 5.1% 0.4 13.7% 13.8% Russell 2000 Growth 13.3% Russell 2000 Growth 1.0

3 Years

4.7%

15.8%

0.3

eA US Small Cap Growth Equity Gross Median

5 Years

Verus⁷⁷

eA US Small Cap Growth Equity Gross Median

15.1%

0.9

13.9%

Capital Prospects Manager Portfolio Overview

Characteristics

	Portfolio	Russell 2000 Value
Number of Holdings	306	1,369
Weighted Avg. Market Cap. (\$B)	2.11	2.00
Median Market Cap. (\$B)	1.16	0.70
Price To Earnings	23.64	21.49
Price To Book	3.19	1.84
Price To Sales	1.94	1.59
Return on Equity (%)	12.23	7.20
Yield (%)	1.63	1.57
Beta	0.89	1.00



Top Contributors

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Largest Holdings						
	End Weight	Return				
LITTELFUSE	1.28	18.09				
HILLENBRAND	1.25	21.88				
MB FINANCIAL	1.23	24.67				
ALLETE	1.17	8.62				
GORES HOLDINGS CL.A	1.15	20.37				
IBERIABANK	1.03	25.30				
ARTISAN PTNS.ASTMGMT.	0.90	11.81				
AIR LEASE	0.89	20.36				
JOHN BEAN TECHNOLOGIES	0.88	21.96				
ABM INDS.	0.86	3.30				

10	Top Contributors					
	Avg Wgt	Return	Contributi			
TEXAS CAPITAL BANCSHARES	0.73	42.75	0.31			
MB FINANCIAL	1.12	24.67	0.28			
HILLENBRAND	1.16	21.88	0.25			
IBERIABANK	0.96	25.30	0.24			
GORES HOLDINGS CL.A	1.14	20.37	0.23			
LITTELFUSE	1.28	18.09	0.23			
MICROSEMI	0.80	28.56	0.23			
EVERCORE PARTNERS 'A'	0.66	34.05	0.22			
STEELCASE 'A'	0.74	29.73	0.22			
META FINANCIAL GROUP	0.30	70.01	0.21			

ion		Avg Wgt	Return	Contribution
	ADVISORY BOARD	0.62	-25.68	-0.16
	GNC HOLDINGS CL.A	0.19	-45.11	-0.09
	ALCOA	0.42	-18.49	-0.08
	RADISYS	0.41	-17.12	-0.07
	HURON CNSL.GP.	0.42	-15.24	-0.06
	RANGE RES.	0.51	-11.28	-0.06
	CHAS.RVR.LABS.INTL.	0.65	-8.58	-0.06
	OCH-ZIFF CAP.MAN.GP.CL.A	0.22	-23.73	-0.05
	HEALTHCARE REAL.TST.	0.43	-10.04	-0.04
	VERINT SYSTEMS	0.66	-6.32	-0.04

Unclassified sector allocation includes cash allocations.



Capital Prospects Manager Performance Comparisons (Gross of Fees)



Rolling Annualized Excess Performance

Capital Prospects vs. eA US Small Cap Value Equity Gross Universe



Verus⁷⁷

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Rolling 3 Year Annualized Return (%)







Capital Prospects Risk vs. Return 3 & 5 Year (Gross of Fees)



Verus⁷⁷

International Equity Managers

LSV Asset Mgt Manager Portfolio Overview

Characteristics

	Portfolio	MSCI ACWI ex USA Gross
Number of Holdings	256	1,856
Weighted Avg. Market Cap. (\$B)	29.22	49.20
Median Market Cap. (\$B)	6.48	6.74
Price To Earnings	14.02	20.17
Price To Book	1.77	2.53
Price To Sales	1.00	1.91
Return on Equity (%)	12.26	13.24
Yield (%)	3.60	2.93
Beta	1.10	1.00

Return

2.83

6.71

-7.57

9.08

2.07

11.05

5.01

9.30

5.99 8.92



Top Contributors

 ev	UUN	01033	

Lar	Largest Holdings				
	End Weight				
SAMSUNG ELECTRONICS	1.79				
SANOFI	1.71				
NIPPON TELG. & TEL.	1.55				
BAE SYSTEMS	1.32				
MAGNA INTL.	1.26				
ALLIANZ	1.23				
SWISS RE	1.10				
SWISS LIFE HOLDING	1.06				
DAIMLER	1.02				
BASF	0.96				

	Top Contributo	
	Avg Wgt	Return
SOCIETE GENERALE	0.61	42.54
RESONA HOLDINGS	0.71	23.25
MITSUBISHI GAS CHM.	0.69	20.20
BNP PARIBAS	0.56	24.17
ALLIANZ	1.18	11.05
AEGON	0.29	43.86
DEUTSCHE BANK	0.32	38.35
OMV	0.53	22.95
BAE SYSTEMS	1.30	9.08
AXA	0.61	18.86

Bottom Contributors

Contribution		Avg Wgt	Return	Contribution
0.26	KT & G	0.57	-26.32	-0.15
0.17	NIPPON TELG. & TEL.	1.66	-7.57	-0.13
0.14	TEVA PHARMACEUTICAL	0.53	-23.43	-0.12
0.14 0.13	KOREA ELECTRIC POWER	0.43	-25.62	-0.11
0.13	KDDI	0.60	-17.51	-0.11
0.12	AHOLD KON.	1.23	-7.34	-0.09
0.12	SKYWORTH DIGITAL HDG.	0.42	-19.08	-0.08
0.12	CIA PARANAENSE DE ENERGIA COPEL PN	0.42	-18.79	-0.08
	EMPIRE 'A'	0.36	-20.86	-0.08
	DISTRIBUIDORA INTNAC.DE ALIMENTACION	0.35	-20.55	-0.07

Unclassified sector allocation includes cash allocations.

LSV Asset Mgt Manager Performance Comparisons



Rolling Annualized Excess Performance



LSV Asset Mgt vs. eA ACWI ex-US Equity Unhedged Gross Universe

Verus⁷⁷

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Rolling 3 Year Annualized Return (%)









LSV Asset Mgt Risk vs. Return 3 & 5 Year (Gross of Fees)



Verus⁷⁷

Fidelity Manager Portfolio Overview

Characteristics

	Portfolio	MSCI ACWI ex USA Gross
Number of Holdings	289	1,856
Weighted Avg. Market Cap. (\$B)	47.25	49.20
Median Market Cap. (\$B)	12.54	6.74
Price To Earnings	22.64	20.17
Price To Book	3.44	2.53
Price To Sales	2.57	1.91
Return on Equity (%)	16.39	13.24
Yield (%)	2.69	2.93
Beta	0.89	1.00



Top Contributore

Largest Holdings		Top Contributors			Bottom Contributors					
	End Weight	Return		Avg Wgt	Return	Contribution		Avg Wgt	Return	Contribution
NESTLE 'R'	1.70	-8.98	MITSUBISHI UFJ FINL.GP.	0.80	23.80	0.19	INTERNATIONAL	0.52	36.06	0.10
SAP	1.41	-4.61	BNP PARIBAS	0.74	24.17	0.18	PSNL.FIN.	0.52	-30.90	-0.19
ROYAL DUTCH SHELL A	1.30	10.01	BARCLAYS	0.63	26.67	0.17	AIA GROUP	1.18	-15.10	-0.18
ROCHE HOLDING	1.23	-7.94	AXA	0.76	18.86	0.14	NESTLE 'R'	1.73	-8.98	-0.15
TOTAL	1.20	9.83	ROYAL DUTCH SHELL A	1.17	10.01	0.12	NASPERS	0.96	-14.73	-0.14
BRITISH AMERICAN TOBACCO	1.16	-10.83	ING GROEP	0.80	14.18	0.11	KDDI	0.77	-17.51	-0.13
PHILIPS ELTN.KONINKLIJKE	1.13	3.18	TOTAL	1.10	9.83	0.11	BRITISH AMERICAN TOBACCO	1.17	-10.83	-0.13
	1.03	-15.10	ROYAL DUTCH SHELL A(LON)	0.87	11.45	0.10	SQUARE ENIX HOLDINGS	0.49	-24.81	-0.12
	1.02	-10.00	DNB	0.68	13.87	0.09	SHIRE	1.00	-10.85	-0.11
SAMSUNG ELECTRUNICS	1.00	2.03	PRUDENTIAI	0.67	13 29	0.09	ROCHE HOLDING	1.26	-7.94	-0.10
				0.01	10.20	5.05	TEVA PHARMACEUTICAL	0.35	-23.43	-0.08

Unclassified sector allocation includes cash allocations.



Rolling Annualized Excess Performance



Fidelity vs. eA ACWI ex-US Equity Unhedged Gross Universe

Verus⁷⁷

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Rolling 3 Year Annualized Return (%)









Fidelity Risk vs. Return 3 & 5 Year (Gross of Fees)



Verus⁷⁷

Domestic Fixed Income Managers



Rolling Annualized Excess Performance

Dodge & Cox-Fixed vs. eA US Core Fixed Inc Gross Universe



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Rolling 3 Year Annualized Return (%)



Dodge & Cox-Fixed Risk vs. Return 3 & 5 Year (Gross of Fees)



3 Years

5 Years



PIMCO Manager Performance Comparisons (Gross of Fees)



Rolling Annualized Excess Performance

PIMCO vs. eA US Core Fixed Inc Gross Universe



Verus⁷⁷



Rolling 3 Year Annualized Return (%)



PIMCO Risk vs. Return 3 & 5 Year (Gross of Fees)



eA US Core Fixed Inc Gross Median

3 Years

3.4%

3.0%

1.1

5 Years



eA US Core Fixed Inc Gross Median

2.9%

1.0

2.9%

Performance Return Calculations

Returns calculated in the performance summary tables are time-weighted rates of return (TWRR). TWRR are calculated from changes in monthly market values, adjusted for weighted cash flows between months. Our performance methodology assumes that cash flows occur at the end of day for modified dietz calculations. Returns are linked geometrically and annualized for periods longer than one year.

Data Source

Verus is an independent third party consulting firm and calculates returns from best source book of record data. Returns calculated by Verus may deviate from those shown by the manager in part, but not limited to, differences in prices and market values reported by the custodian and manager, as well as significant cash flows into or out of an account. It is the responsibility of the manager and custodian to provide insight into the pricing methodologies and any difference in valuation.

Illiquid Alternatives

Closed end funds including but not limited to Real Estate, Hedge Funds, Private Equity, and Private Credit may lag performance and market value data due to delayed reporting. Verus will show market values for closed end funds as of the most recent reported performance adjusted for capital calls and distributions. Closed end fund managers report performance using an internal rate of return (IRR), which differs from the TWRR calculation done by Verus. It is inappropriate to compare IRR and TWRR to each other. IRR figures reported in the illiquid alternative pages are provided by the respective managers, and Verus has not made any attempts to verify these returns. Until a partnership is liquidated (typically over 10-12 years), the IRR is only an interim estimated return. The actual IRR performance of any LP is not known until the final liquidation.

Manager Line Up					
Manager	Fund Incepted	Data Source	Manager	Fund Incepted	Data Source
Mellon S&P 500	04/30/2003	Mellon	Prime Property Fund	09/30/2015	Prime Property
BlackRock Russell 1000 Growth	06/30/2010	BlackRock	American Strategic Value Realty	12/31/2014	American Realty
Jackson Square	08/31/2006	Northern Trust	BlackRock US Real Estate	09/30/2012	BlackRock
BlackRock Russell 1000 Value	07/31/2009	BlackRock	Greenfield Gap	07/31/2014	Greenfield
Dodge & Cox - Equity	12/31/1994	Northern Trust	Invesco	02/29/2008	Mellon
Legato Capital	12/31/2008	Northern Trust	Medley Capital	05/31/2013	Medley Capital
Capital Prospects	12/31/2008	Northern Trust	Raven Capital	05/31/2013	Raven Capital
LSV Asset Mgt	08/31/2004	Northern Trust	Raven Opportunity III	07/31/2015	Raven Capital
Pyramis	04/30/2006	Northern Trust	White Oak Pinnacle	08/31/2013	White Oak
Dodge & Cox - Fixed	12/31/1994	Northern Trust	MS Infrastructure	05/31/2015	Morgan Stanley
PIMCO	05/31/2010	Northern Trust			

Policy & Custom Index Composition

Policy Index:	14.4% Russell 1000 Value, 11.3% Russell 1000 Growth, 4.8% S&P 500, 4.0% Russell 2000 Value, 3.7% Russell 2000 Growth, 18.0% MSCI ACWI ex USA, 29.8% BBgBarc US Aggregate, 3.5% DJ US Select RESI, 7.5% 9% Annual, 3% CPI + 4%.
LIC Equity Disadad	90% Dussel 4000, 20% Dussel 2000

US Equity Blended: 80% Russell 1000, 20% Russell 2000.

Other Disclosures

Fiscal Year End: 6/30

Cash Account includes cash held at Northern Trust for all closed end funds. All data prior to 6/30/2015 provided by the previous consultant.

Glossary

Allocation Effect: An attribution effect that describes the amount attributable to the managers' asset allocation decisions, relative to the benchmark.

Alpha: The excess return of a portfolio after adjusting for market risk. This excess return is attributable to the selection skill of the portfolio manager. Alpha is calculated as: Portfolio Return - [Risk-free Rate + Portfolio Beta x (Market Return - Risk-free Rate)].

Benchmark R-squared: Measures how well the Benchmark return series fits the manager's return series. The higher the Benchmark R-squared, the more appropriate the benchmark is for the manager. Beta: A measure of systematic, or market risk; the part of risk in a portfolio or security that is attributable to general market movements. Beta is calculated by dividing the covariance of a security by the variance of the market.

Book-to-Market: The ratio of book value per share to market price per share. Growth managers typically have low book-to-market ratios while value managers typically have high book-to-market ratios. Capture Ratio: A statistical measure of an investment manager's overall performance in up or down markets. The capture ratio is used to evaluate how well an investment manager performed relative to an index during periods when that index has risen (up market) or fallen (down market). The capture ratio is calculated by dividing the manager's returns by the returns of the index during the up/down market, and multiplying that factor by 100.

Correlation: A measure of the relative movement of returns of one security or asset class relative to another over time. A correlation of 1 means the returns of two securities move in lock step, a correlation of -1 means the returns of two securities move in the exact opposite direction over time. Correlation is used as a measure to help maximize the benefits of diversification when constructing an investment portfolio.

Excess Return: A measure of the difference in appreciation or depreciation in the price of an investment compared to its benchmark, over a given time period. This is usually expressed as a percentage and may be annualized over a number of years or represent a single period.

Information Ratio: A measure of a manager's ability to earn excess return without incurring additional risk. Information ratio is calculated as: excess return divided by tracking error.

Interaction Effect: An attribution effect that describes the portion of active management that is contributable to the cross interaction between the allocation and selection effect. This can also be explained as an effect that cannot be easily traced to a source.

Portfolio Turnover: The percentage of a portfolio that is sold and replaced (turned over) during a given time period. Low portfolio turnover is indicative of a buy and hold strategy while high portfolio turnover implies a more active form of management.

Price-to-Earnings Ratio (P/E): Also called the earnings multiplier, it is calculated by dividing the price of a company's stock into earnings per share. Growth managers typically hold stocks with high price-to-earnings ratios whereas value managers hold stocks with low price-to-earnings ratios.

R-Squared: Also called the coefficient of determination, it measures the amount of variation in one variable explained by variations in another, i.e., the goodness of fit to a benchmark. In the case of investments, the term is used to explain the amount of variation in a security or portfolio explained by movements in the market or the portfolio's benchmark.

Selection Effect: An attribution effect that describes the amount attributable to the managers' stock selection decisions, relative to the benchmark.

Sharpe Ratio: A measure of portfolio efficiency. The Sharpe Ratio indicates excess portfolio return for each unit of risk associated with achieving the excess return. The higher the Sharpe Ratio, the more efficient the portfolio. Sharpe ratio is calculated as: Portfolio Excess Return / Portfolio Standard Deviation.

Sortino Ratio: Measures the risk-adjusted return of an investment, portfolio, or strategy. It is a modification of the Sharpe Ratio, but penalizes only those returns falling below a specified benchmark. The Sortino Ratio uses downside deviation in the denominator rather than standard deviation, like the Sharpe Ratio.

Standard Deviation: A measure of volatility, or risk, inherent in a security or portfolio. The standard deviation of a series is a measure of the extent to which observations in the series differ from the arithmetic mean of the series. For example, if a security has an average annual rate of return of 10% and a standard deviation of 5%, then two-thirds of the time, one would expect to receive an annual rate of return between 5% and 15%.

Style Analysis: A return based analysis designed to identify combinations of passive investments to closely replicate the performance of funds

Style Map: A specialized form or scatter plot chart typically used to show where a Manager lies in relation to a set of style indices on a two-dimensional plane. This is simply a way of viewing the asset loadings in a different context. The coordinates are calculated by rescaling the asset loadings to range from -1 to 1 on each axis and are dependent on the Style Indices comprising the Map.

Verus⁷⁷

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The information presented may be deemed to contain forward-looking information. Examples of forward looking information include, but are not limited to, (a) projections of or statements regarding return on investment, future earnings, interest income, other income, growth prospects, capital structure and other financial terms, (b) statements of plans or objectives of management, (c) statements of future economic performance, and (d) statements of assumptions, such as economic conditions underlying other statements. Such forward-looking information can be identified by the use of forward looking terminology such as believes, expects, may, will, should, anticipates, or the negative of any of the foregoing or other variations thereon comparable terminology, or by discussion of strategy. No assurance can be given that the future results described by the forward-looking information will be achieved. Such statements are subject to risks, uncertainties, and other factors which could cause the actual results to differ materially from future results expressed or implied by such forward looking information. The findings, rankings, and opinions expressed herein are the intellectual property of Verus and are subject to change without notice. The information presented does not claim to be all-inclusive, nor does it contain all information that clients may desire for their purposes. The information presented should be read in conjunction with any other material provided by Verus, investment managers, and custodians.

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Verus receives universe data from InvestorForce, eVestment Alliance, and Morningstar. We believe this data to be robust and appropriate for peer comparison. Nevertheless, these universes may not be comprehensive of all peer investors/managers but rather of the investors/managers that comprise that database. The resulting universe composition is not static and will change over time. Returns are annualized when they cover more than one year. Investment managers may revise their data after report distribution. Verus will make the appropriate correction to the client account but may or may not disclose the change to the client based on the materiality of the change.

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Stanislaus County Employees' Retirement Association Portfolio Risk Report

December 31, 2016

1 Portfolio risk



Portfolio: 9.0%

2 Portfolio equity beta





Policy: 8.5%



Portfolio: 0.64

Policy: 0.60

3 Portfolio interest rate risk - Duration





Policy: 2.1



Typical Peer: 0.53

Typical Peer: 7.5%

Typical Peer: 1.9

4 Portfolio credit risk - Spread duration



Portfolio: 1.3



Policy: 1.5



Typical Peer: 1.1

5 Exposure allocation by asset class

		Portfolio	Policy	Typical Peer
Alternative	Real Assets	0.0%		2.1%
	Hedge Fund	0.0%		8.1%
	Infrastructure	0.6%	3.0%	
	Real Estate	4.2%	3.5%	7.4%
	Private Credit	4.9%	7.5%	
Alternative Total		9.8%	14.0%	17.6%
Cash	Cash	0.1%		1.1%
Cash Total		0.1%		1.1%
Equity	Private Equity	0.0%		6.0%
	US Small Cap Growth	4.7%	3.7%	
	US Large Cap Core	5.0%	4.8%	26.1%
	US Small Cap Value	5.4%	4.0%	
	US Large Cap Growth	11.5%	11.3%	
	US Large Cap Value	16.5%	14.4%	
	Non-US Equity	19.6%	18.0%	18.5%
Equity Total		62.7%	56.2%	50.6%
Fixed Income	Global Bonds	0.0%		4.3%
	Non-US Bonds	0.0%		3.9%
	US Bonds	27.4%	29.8%	22.5%
Fixed Income Total		27.4%	29.8%	30.7%
Total Portfolio		100%	100%	100%

6 Exposure allocation



7 Relative risk vs target by bucket



8 Relative risk vs target by risk factor



9 Risk factor weight relative to target



10 Tail risk - Scenario analysis



11 Tail risk - Stress tests



12 Risk contribution by risk factor



13 Active risk contribution by risk factor



14 Geographic exposure



15 Currency exposure



16 Net geographic exposure



17 Net currency exposure



18 Interest rate bucket

	Portfolio	Policy	Difference
Duration	5.8	5.8	0.0
Yield to Maturity	3.1%	3.1%	0.0%
Wt. Avg. Rating	Aa1 / Aa2	Aa1 / Aa2	

19 Rates bucket - Geographic exposure



21 Rates bucket - Security type



20 Rates bucket - Currency exposure



22 Credit bucket

	Portfolio	Policy	Difference
Duration	4.4	4.4	0.0
Coupon Yield	6.6%	6.6%	0.0%
Yield to Maturity	6.3%	6.3%	0.0%
Wt. Avg. Rating	Ві	Вı	

23 Credit bucket - Geographic exposure



24 Credit bucket - Currency exposure



25 Credit bucket - Security type



26 Inflation bucket

	Portfolio	Policy	Difference
Real Estate Allocation	4.2%	3.5%	0.7%
Global Infrastructure	0.6%	3.0%	-2.4%

27 Inflation bucket - Geographic exposure



29 Inflation bucket - Security type



28 Inflation bucket - Currency exposure



30 Equity bucket

	Portfolio	Policy	Difference
Beta	1.0	1.0	0.0
Dividend Yield	2.3%	2.3%	0.0%
PE Ratio	21.6	21.6	0.0

31 Equity bucket - Geographic exposure



32 Equity bucket - Currency exposure



33 Equity bucket - Security type



34 Market value summary per BarraOne

Bucket	Asset Class	Account Name	Account	Market Value (millions)
Cash	Cash	Cash	STANCERADB034	2.1
Cash Total				2.1
Credit	HY Bonds	White Oak Pinnacle	STANCERADB032	36.1
		Medley Capital	STANCERADB029	23.9
		Raven Capital	STANCERADB030	18.7
		Raven Opportunity III	STANCERADB031	13.1
Credit Total				91.8
Equity	EAFE Equity	LSV Asset Mgt	STANCERADB021	184.6
		Pyramis	STANCERADB022	179.5
	US Equity	Dodge & Cox-Equity	STANCERADB005	193.9
		Jackson Square	STANCERADB003	124.6
		BlackRock Russell 1000 Value	STANCERADB004	112.1
		Capital Prospects	STANCERADB013	101.1
		Mellon S&P 500	STANCERADB001	93.2
		BlackRock Russell 1000 Growth	STANCERADB002	90.1
		Legato Capital	STANCERADB006	87.2
Equity Total				1,166.2
Inflation	Infrastructure	MS Infrastructure Partners II	STANCERADB033	11.5
	Real Estate	BlackRock US Real Estate	STANCERADB027	30.0
		American Strategic Value Realty	STANCERADB026	18.9
		Prime Property Fund	STANCERADB025	16.9
		Greenfield Gap	STANCERADB028	13.2
Inflation Total				90.4
Rates	US Bonds	Dodge & Cox-Fixed	STANCERADB023	394.8
		PIMCO	STANCERADB024	114.4
Rates Total				509.2
Chart Definitions

1 Portfolio risk

Total risk comparison of portfolio, Policy, and Avg. Pension. Policy is composed of 18% MSCI ACWI ex US, 4.8% S&P 500, 11.3% Russell 1000 Growth, 14.4% Russell 1000 Value, 3.7% Russell 2000 Growth, 4.0% Russell 2000 Value, 29.8% Barclays Capital US Aggregate, 3% MSCI ACWI Infrastructure, 7.5% Barclays Capital US Corporate High Yield, and 3.5% NFI ODCE. Average pension is based on median allocation of DB Plans > \$1 Billion, which is composed of 1.1% Cash, 26.1% US Equity, 15.1% Global ex-US Equity, 3.4% EM Equity, 6% Private Equity, 22.5% US Fixed Income, 4.3% Global Fixed Income, 1.5% Global ex-US Fixed Income, 2.4% EM Fixed Income, 8.1% Hedge Fund, 1.05% Commodity, 1.05% Forestry, and 7.4% Real Estate.

2 Portfolio equity beta

Equity risk presented by equity beta to market. Equity beta is a measure describing the sensitivity of portfolio returns with returns of the equity market (MSCI ACWI).

3 Portfolio interest rate risk - Duration

Interest rate risk presented by duration and dollar movement of portfolios. Duration of a financial asset that consists of fixed cash flows is the weighted average of the times until those fixed cash flows are received (measured in years). It also measures the percentage change in price for a given change in yields (the price sensitivity to yield). DVo1 \$ (dollar duration) is the change in price in dollars of a financial instrument resulting from a one basis point change in yield.

4 Portfolio credit risk - Spread duration

Credit risk presented by spread duration and dollar movement of portfolios. Spread duration measures the percentage change in price for a one percentage point change in spreads.

5 Exposure allocation by asset class

Exposure allocation among various asset classes.

6 Exposure allocation

Exposure allocation among major risk buckets (rates, credit, equity, inflation, currency) and net currency exposure (domestic vs. foreign). Full Cash collateral is assumed for all derivatives.

7 Relative risk vs target by bucket

Comparative riskiness of Portfolio vs. Policy on total portfolio and risk bucket levels: For example, equity bucket relative risk compares the riskiness of the Portfolio equity bucket vs the Policy equity bucket.

8 Relative risk vs target by risk factor

Comparative riskiness of Portfolio vs. Policy on a total portfolio level and major risk factor levels.

9 Risk factor weight relative to target

Contribution by factor to total relative risk of the Portfolio vs the Policy: For example, Equity is equity risk contribution to Portfolio minus equity risk contribution to the Policy, divided by total risk of the Policy. The factor overweights are additive to the total relative risk at the top line.

10 Tail risk - Scenario analysis

Tail risk is a form of risk measurement that considers the possibility that a market will experience losses greater than what the normal distribution would suggest. This graph shows the expected performance under various historical scenarios (described in the appendix at the end of this report). For each historical scenario, the current market value is recalculated to determine return under identical market conditions, assuming an instantaneous shock.

11 Tail risk - Stress tests

This display shows expected performance when individual risk factors are subjected to instantaneous shocks. Directly affected assets are revalued at factor level

12 Risk contribution by risk factor

Risk contribution by risk factor. Volatility measures the price variation of a portfolio or financial instrument over time.

13 Active risk contribution by risk factor

Active risk in terms of annual tracking error: Tracking Error (TE) measures how closely a portfolio follows its benchmark. It is the standard deviation of the difference between the portfolio and benchmark returns.

14 Geographic exposure

Geographic exposures are calculated using the notional exposure as a percentage of market value, including derivatives, cash securities and currency holdings, but excluding currency derivatives. Any portfolio that uses derivatives may have a total different than 100% because both cash and derivative country exposures are included.

15 Currency exposure

Currency portfolio allocation. Currency exposures from both the underlying securities and the purchasing currency of the futures contract are included.

16 Net geographic exposure

Difference between portfolio and policy allocation among major geographic areas.

17 Net currency exposure

Difference between portfolio and policy allocation among major currencies.

18 Interest rate bucket

Coupon yield (nominal yield) of a fixed income security is a fixed percentage of the par value that does not vary with the market price of the security. Yield to Maturity (YTM) is the interest rate of return earned by an investor who buys a fixed-interest security today at the market price and holds it until maturity. Ratings indicate credit quality of a security and the issuer's ability to make payments of interest and principal.

19 Rates bucket - Geographic exposure

Geographic exposures specific to the Rates bucket are calculated using the notional exposure as a percentage of market value, including derivatives, cash securities and currency holdings, but excluding currency derivatives. Any portfolio that uses derivatives may have a total different than 100% because both cash and derivative country exposures are included.

20 Rates bucket - Currency exposure

Currency allocation of interest rate instruments.

21 Rates bucket - Security type

Allocation of interest rate instruments among different security types.

22 Credit bucket

Various characteristics of credit instruments.

23 Credit bucket - Geographic exposure

Geographic exposures specific to the Credit bucket are calculated using the notional exposure as a percentage of market value, including derivatives, cash securities and currency holdings, but excluding currency derivatives. Any portfolio that uses derivatives may have a total different than 100% because both cash and derivative country exposures are included.

24 Credit bucket - Currency exposure

Currency allocation of credit instruments.

25 Credit bucket - Security type

Allocation of credit instruments among different security types.

26 Inflation bucket

Composition of inflation hedging instruments in portfolio and benchmark. Notional duration of real rates instruments is also included.

27 Inflation bucket - Geographic exposure

Geographic exposures specific to the Inflation bucket are calculated using the notional exposure as a percentage of market value, including derivatives, cash securities and currency holdings, but excluding currency derivatives. Any portfolio that uses derivatives may have a total different than 100% because both cash and derivative country exposures are included.

28 Inflation bucket - Currency exposure

Currency allocation of inflation instruments.

29 Inflation bucket - Security type

Allocation of inflation instruments among different security types.

30 Equity bucket

P/E ratio is a valuation ratio of a company's current share price compared to its per-share earnings. Beta measures sensitivity to Global Equities.

31 Equity bucket - Geographic exposure

Geographic exposures specific to the Equity bucket are calculated using the notional exposure as a percentage of market value, including derivatives, cash securities and currency holdings, but excluding currency derivatives. Any portfolio that uses derivatives may have a total different than 100% because both cash and derivative country exposures are included.

32 Equity bucket - Currency exposure

Currency allocation of equity assets.

33 Equity bucket - Security type

Allocation of equity assets among different security types.

34 Market value summary per BarraOne

Summary of market value of Portfolio holdings by bucket as reported through BarraOne. Some differences may exist due to timing, pricing sources and availability of information on new investments.

Tail Risk Scenario Definitions

1 2009-2010 July-January

(7/1/2009 - 12/31/2009) As global economic woes persisted, many countries were saddled with widening budget deficits, rising borrowing costs, slowing growth, higher unemployment, and higher inflation, which made monetary stimulus difficult. Dubai World sought to delay its huge debt repayments, shocking the global market, while the financial distress in Greece and Ireland began to emerge in late 2009.

2 2007-2009 Subprime Meltdown

(1/10/2007 - 2/27/2009) The burst of the housing bubble in mid-2007 marked the beginning of the years-long subprime mortgage crisis, rooted from the easy credit, low interest rates, and loose regulatory environment in the early 2000s, which made low quality (subprime) mortgaging extremely easy. The contagious meltdown quickly led to plunging asset prices in the financial markets, rising bankruptcies, delinquencies, and foreclosures, and central bank monetary rescues and fiscal interventions by governments around the globe.

3 2007-2008 Oil Price Rise

(1/18/2007 - 6/27/2008) Oil prices spiked from around \$60/bbl in 2007 to a record high of \$145/bbl on 3 July 2008.

4 2001 Dot-com Slowdown

(3/10/2001 - 10/9/2002) Upon the burst of the tech bubble in 2000, more and more internet companies went out of business as the stock market plummeted further.

5 1997-1999 Oil Price Decline

(1/8/1997 - 2/16/1999) The combined effect of OPEC overproduction and lower oil demand due to the Asia economic crisis sent oil prices into a downward spiral.

6 1994 US Rate Hike

(1/31/1994 - 12/13/1994) In combating inflation, the U.S. Federal Reserve raised its interest rate from 3.25% in February to 5.5% in November 1994.

7 1992-1993 European Currency Crisis

(9/1/1992 - 8/13/1993) Upon Germany's reunification, the German mark appreciated rapidly, which destabilized exchange rates between European countries under the European Monetary System. It led to a series of European currency devaluations, interest rate increases, and the widening range of exchange rates in 1992.

8 1989-1990 Nikkei Stock Price Correction

(12/29/1989 - 3/30/1990) After hitting the Nikkei stock index's all-time high on December 29, 1989, the Japan financial market crashed and plunged to a low in March 1990.

9 1987 Market Crash (Oct 14 to Oct 19)

(10/14/1987 - 10/19/1987) The U.S. stock market began to topple on October 14, 1987 after reaching a record high. It was triggered by reports of a larger trade deficit and the elimination of the tax benefits of financing mergers. The aggravating selling pressure in October 19, from confused and fearful investors, and the failing portfolio insurers' models led to a substantial global market sell-off.

10 1972-1974 Oil Crisis (Dec to Sep)

(12/1/1972 - 9/30/1974) Many developed countries suffered in this energy crisis as OPEC members placed an oil embargo on the U.S. and Israel's allies during the Yom Kippur War in October 1973, which sent global oil prices soaring.

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PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

FEBRUARY 28, 2017

Risk Parity Search

Stanislaus County Employees' Retirement Association

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Executive summary



Executive Summary

- With the Board's May 2016 adoption of the "FFP 6-yr" asset allocation, 14% of Plan assets will be allocated to Risk Parity strategies.
- This presentation outlines the considerations in implementing Risk Parity into the portfolio including:
 - Risk Parity strategy overview;
 - The search process for identifying and selecting managers/strategies;
 - Risk Parity portfolio design; and
 - A recommended approach utilizing multiple managers.
- This presentation concludes with a recommendation that the Board direct Staff and Verus to conduct on-site due diligence with selected investment managers, determine portfolio structure, and present a final recommendation to the Board at the April meeting.



Risk parity overview



Risk parity overview

- The "FFP 6-yr" asset allocation prescribes a 14% allocation to Risk Parity strategies.
 - Multiple managers will be employed to mitigate single-manager risk and provide redundancy
- Risk parity is not an asset class but rather an approach to managing a group of asset classes that seeks balanced exposure for consistent performance across market environments
 - Risk parity focuses on the allocation of <u>risk</u>, defined as volatility, rather than the allocation of capital
- Risk Parity strategies are long-only portfolios that seek to generate returns through persistent exposure to:
 - Global Equity For upside participation in periods of growth;
 - Global Fixed Income For downside protection in periods of weaker growth; and
 - Commodities and Global Inflation-Link Bonds To preserve real rates of return in inflationary periods.



Traditional portfolio

CAPITAL AND RISK ALLOCATION (ILLUSTRATIVE)



The Traditional Approach may result in the Plan closely tracking the outcome of the equity market.

10 Year Performance:Return: 3.3%Std. Dev.: 11.2%Sharpe Ratio: 0.23Max Drawdown: -35.2%

Source: eVestment. Performance statistics shown for 55% ACWI IMI, 35% Barclays Global Aggregate, 10% Bloomberg Commodities Index. As of 12/31/16.



Risk parity portfolio

CAPITAL AND RISK ALLOCATION (ILLUSTRATIVE)



The Risk Parity Approach, through the use of leverage, weights assets so that all investments influence the portfolio similarly.

<u>10 Year Performance:</u> Return: 4.5% Std. Dev.: 10.5% Sharpe Ratio: 0.31 Max Drawdown: -27.6%

Performance shown for Salient Risk Parity Index as of 12/31/16..



Leverage in portfolios

Just like Risk Parity, most investments contain leverage

- Public and Private Equity, Real Estate, Infrastructure, and Hedge Funds
 - Leverage is embedded throughout the portfolio but often encapsulated
- Securitization (or in the case of Risk Parity commingled fund) allows it to be non-recourse leverage

Risks of leverage can be controlled with good risk management

- Levering a diversified portfolio of liquid assets
- Active rebalancing to target constant and balanced market risk
- Maintaining high levels of unencumbered cash
- Utilizing instrument leverage through exchange-traded and centrally cleared futures (not borrowed leverage)
- Bulk of leverage applied to the least risk assets (i.e., fixed income)

StanCERA AA Implementation - Risk Parity Search February 28, 2017

In Risk Parity, leverage is generally obtained through the use of futures.



Search process



Risk parity manager search process

- For this search, StanCERA utilized Verus' "focus list" of Risk Parity managers.
- Verus maintains focus lists that have been developed and are maintained via an RFP type selection process. Identified strategies have met rigorous quantitative and qualitative screens, indepth investment due diligence meetings, and final approval by Verus' Investment Committee.



* Focus list strategies not presented to StanCERA were excluded due to plan size restrictions not being met.



Manager discussion



Risk parity manager overview

	AQR Global Risk Premium Enhanced Liquidity	First Quadrant Essential Beta	Panagora Risk Parity Multi-Asset
Location	Greenwich, CT	Pasadena, CA	Boston, MA
Ownership structure	70% employee owned / 30% owned by AMG	25% employee owned / 75% owned by AMG	20% employee owned / 80% owned by Great West Life/Putnam Investments & Nippon Life Insurance Company
Firm inception	1998	1988	1989
Firm assets	\$175.2 bn	\$22.1 bn	\$42.8 bn
Target Vol.	10%	10%	10%
Max Leverage	300% gross notional	No explicit leverage limit	350% gross notional
Tactical Tilts?	No	Model Driven & Non-Model Driven	Model Driven
Strategy inception	October 2011	March 2009	January 2006
Strategy assets	\$13.0 bn	\$2.2 bn	\$8.5 bn
Key investment professionals	John Liew, PhD, Founding Principal Brian Hurst, Principal, PM Michael Mendelson, Principal, PM Yao Hua Ooi, Principal, PM John Huss, VP, PM	Max Darnell, Managing Partner, CIO Edgar Peters, Partner, Investments Bruno Miranda, PhD, Director, Investments Suneal Chaudhary, PhD, Assoc. Dir., Risk	Edward Qian, PhD, CIO & Head of Research Bryan Belton, Director, Multi-Asset Mark Barnes, PhD, Director, Multi-Asset David Liddell, Director, Multi-Asset Jonathan Beaulieu, PM, Muti-Asset
Vehicles & Fees	Commingled Fund 0.38% on all assets	Separate Account & Commingled Fund 0.40% on first \$100 mm 0.35% on next \$250 mm 0.20% above \$350 mm	Separate Account & Commingled Fund 0.35% on all assets (plus custody fees for separate accounts)



Risk parity manager performance

	AQR	PanAgora	First Quadrant	60/40 Global Portfolio
Statistics (5 Years)				
Annualized Return, %	3.5	8.4	3.1	6.4
Annualized StdDev, %	7.8	8.5	8.9	7.5
Sharpe Ratio	0.5	1.0	0.4	0.9
Avg Loss, %	-1.9	-1.9	-2.1	-1.6
Loss Frequency, %	40.0	36.7	40.0	40.0
Max Drawdown Return, %	-14.3	-9.4	-16.1	-7.2
Max Drawdown Period	Sep-14 - Dec-15	May-13 - Jun-13	Sep-14 - Jan-16	Sep-14 - Jan-16
Recovery Period	Jan-16 - Sep-16	Jul-13 - Feb-14	Feb-16 - Sep-16	Feb-16 - Jul-16
Skewness	-0.7	-0.5	-0.5	-0.2
Excess Kurtosis	0.0	1.3	0.4	
Returns to Date				
1 Year	11.1	13.7	14.5	5.5
3 Year	2.7	8.0	3.1	2.3
5 Year	3.5	8.4	3.1	6.4
7 Year	7.3	10.3	6.0	5.7
10 Year	7.3	7.7		3.9
Common (Mar-09)	8.9	11.2	8.2	9.6
Calendar Year Returns				
2016	11.1	13.7	14.5	5.5
2015	(9.0)	(3.4)	(8.2)	(1.6)
2014	7.0	14.9	4.2	3.2
2013	(2.4)	3.6	(1.5)	14.2
2012	12.2	14.7	8.1	11.3
2011	12.7	11.3	8.9	(0.9)
2010	22.3	18.8	18.1	9.6
2009	14.0	7.2		20.7
2008	(7.4)	(13.4)		(24.9)
2007	17.0	14.4		9.4
2006	3.4	(1.2)		14.6

*AQR launched its first Risk Parity strategy, AQR GRP, in January 2006. AQR GRP-EL (Enhanced Liquidity) was launched in October 2011. Returns shown for AQR GRP-EL prior to October 2011 represent actual AQR GRP returns adjusted to simulate constraints in place for GRP-EL product.



Correlations

January 2009 – December 2016

	AOP	Danagora	Eirst Quadrant
AOP	AQN		
	0.00	0.88	0.91
Panagora	0.88		0.90
First Quadrant	0.91	0.90	
60/40 Global Portfolio	0.63	0.66	0.73
US Equity	0.49	0.54	0.61
Int'l Equity	0.54	0.55	0.64
EM Equity	0.60	0.59	0.68
US Rates	0.33	0.41	0.25
Non-US Rates	0.64	0.65	0.65
Credit	0.64	0.63	0.56
High Yield	0.58	0.53	0.61
EM Bonds	0.70	0.74	0.74
REITs	0.58	0.69	0.65
TIPS	0.65	0.66	0.64
Commodities	0.58	0.42	0.59
Cash	0.11	0.10	0.17

Risk Parity managers have historically provided a diversification benefit to portfolios, as evidenced by the low to medium correlations across major asset classes, while providing solid risk-adjusted returns.



Portfolio design



Combined "50/50" portfolio performance

	AQR / PanAgora	AQR / FQ	PanAgora / FQ	60/40 Global Portfolio
Statistics (5 Years)				
Annualized Return, %	5.9	51.8	3.3	6.4
Annualized StdDev, %	7.9	8.5	8.1	7.5
Sharpe Ratio	0.8	0.7	0.4	0.9
Avg Loss, %	-2.0	-2.2	-2.0	-1.6
Loss Frequency, %	36.7	35.0	40.0	40.0
Max Drawdown Return, %	-10.9	-10.4	-15.1	-7.2
Max Drawdown Period	May-15 - Dec-15	May-13 - Jun-13	Sep-14 - Dec-15	Sep-14 - Jan-16
Recovery Period	Jan-16 - Jun-16	Jul-13 - Feb-14	Jan-16 - Sep-16	Feb-16 - Jul-16
Skewness	-0.6	-0.5	-0.6	-0.2
Excess Kurtosis	0.8	1.1	0.2	
Returns to Date				
1 Year	12.4	14.1	12.8	5.5
3 Year	5.3	5.6	2.9	2.3
5 Year	5.9	5.8	3.3	6.4
7 Year	8.8	8.1	6.6	5.7
10 Year	7.5			3.9
Common (Mar-09)	10.1	9.7	8.6	9.6
Calendar Year Returns				
2016	12.5	14.1	12.8	5.5
2015	(6.2)	(5.9)	(8.6)	(1.6)
2014	10.9	9.5	5.6	3.2
2013	0.6	1.0	(1.9)	14.2
2012	13.5	11.3	10.1	11.3
2011	12.0	10.1	10.8	(0.9)
2010	20.5	18.5	20.2	9.6
2009	10.5			20.7
2008	(10.3)			(24.9)
2007	15.7			9.4
2006	1.1			14.6

Sources: MPI, eVestment, gross of fees, through 4Q 2016



Illustrative portfolio characteristics

The table below shows the key characteristics of a 50% Panagora / 50% AQR portfolio:

- Balanced risk exposures across asset classes
- Approximately 247% gross notional exposure
- Cost: 36.5 bps total blended fee



SUB-ASSET CLASS RISK ALLOCATION



ASSET CLASS RISK ALLOCATION VS. CAPITAL ALLOCATION

Sources: Panagora, AQR, eVestment, As of 12/31/16

Verus⁷⁷

Risk parity manager write-ups





Manager Evaluation

Applied Quantitative Research Capital Management Global Risk Premium (GRP)

STRATEGY BASICS

Asset Class:	Risk Diversified Fund
Investment Style:	Risk Parity
Firm Inception:	1998
Firm Assets:	\$175.2 Billion
Strategy Inception:	2006*
Strategy Assets:	\$26.2 Billion
Min. Investment:	\$5 Million
Commingled Vehicle**:	CIT for 10%, 12%, 15%, and 20% total volatility target
	GRP, GRPT, GRP-EL, GRPT-EL are each unique versions of the common underlying risk parity strategy
Fees:	Varies by total volatility target
Liquidity:	Daily or weekly

*Original AQR Risk Parity product was launched in January 2006 and is currently soft closed. Global Risk Parity Enhanced Liquidity (GRP-EL) strategy excludes credit to provide enhanced liquidity. ** Vehicles details and fees are provided in the "Fund Terms" section at the end of the write-up.

Firm Background and History

Established in 1998, Applied Quantitative Research Capital Management, LLC (AQR) is an independently-owned investment management firm registered with the Securities and Exchange Commission under the Investment Advisers Act of 1940. The firm's founding principals came out of the Goldman Sachs Asset Management Quantitative Research Group.

AQR is located in Greenwich, CT, and has over 550 fulltime employees. AQR's twenty six principals hold more than 70% of the firm's equity interest. In 2004, Affiliated Managers Group (NYSE: AMG) bought a minority interest of less than 25% in the firm. In December 2014, AMG increased their effective ownership interest to

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approximately 30%. AQR remains employee-operated and is fully independent with respect to operations and managing its investment process. AQR also owns a stake in affiliate CNH Partners, managed by Mark Mitchell and Todd Pulvino.

AQR employs a systematic and global multi-asset class investment process. All of the firm's quantitative models are based on identified economic principles. The firm manages strategies in traditional long-only equities, alternative absolute return strategies and risk parity. The firm has more than a decade of experience managing riskand style-based portfolios, hedge funds and traditional long- only strategies.

Strategy Background

The AQR Global Risk Premium ("GRP") seeks to efficiently and systematically capture return drivers or risk premia derived from exposures to traditional asset classes. The following asset classes are used to achieve desired exposures: U.S. large, mid, and small capitalization as well as developed and emerging equities, developed nominal and inflation-linked bonds, and global commodities. The strategy targets an equal risk contribution from each of the four main risk buckets: equities, rates, credit/FX and inflation calculated as the beta of each risk bucket to the total portfolio. Portfolio risk is measured using one-year ex-ante volatility. The strategic balancing of risk within a portfolio is commonly referred to as risk parity or riskbalanced. Unlike other strategies within the peer group, the primary AQR GRP strategy delivers a pure risk parity product that does not rely on any tactical tilts to generate alpha. Traditional risk parity strategies provide a much more balanced approach to gaining exposure to different return drivers than traditional equity centric portfolios. Within a traditional capital allocated portfolio with an allocation of 60% equity/40% bonds over 90% of the total portfolio volatility is due to equity risk – this concentration is avoided in a risk parity framework.



AQR also offers an "extended liquidity" version of the basic strategy, GRP-EL, which excludes the credit and currencies component. The firm also offers a version with an overlay of tactical tilts which introduces systematic yet more active views and variability of risk positioning.

AQR believes that the risk parity approach maximizes the diversification benefit across a broad range of economic environments: equity benefits from long-term economic growth; nominal interest rates could provide attractive returns during periods of stress and/or deflation; and TIPS and commodities provide protection from price inflation. AQR empirical research appears to show that over the long-term all major asset classes have approximately equal risk-adjusted returns. Due to diversification they state an equally risk-weighted portfolio provides 0.15-0.20 improvement in long-term risk adjusted returns (Sharpe ratio) compared to long-term Sharpe ratios of individual asset classes.

In order to increase the notional exposure of lower risk asset classes (e.g. sovereign bonds), leverage is usually required to equalize their contribution to total risk. The amount of leverage varies substantially over time as a function of the relative volatility of different risk buckets comprising the portfolio and correlations among them. For the portfolio targeting 10% volatility, leverage is capped at 300%. Additionally, the strategy is available for 12%, 15%, and 20% target volatilities.

As part of the portfolio construction and risk mitigation process, AQR has incorporated an explicit drawdown control mechanism that limits the maximum drawdown at 15% by reducing the total portfolio volatility up to 50% during periods of heightened market volatility. The drawdown control mechanism is launched and removed automatically. Manual overrides are possible under very extreme market or economic conditions including geopolitical conflicts and shut-down of exchanges. The fund is rebalanced approximately 25 times during the year. AQR places emphasis on trading low cost, liquid securities. Relative to other risk-balanced strategies, the Fund offers relatively low fees. It provides daily or weekly liquidity, depending on target volatility and vehicle type.

Key Investment Professionals

The Fund's Investment Committee is comprised of seven senior members of the firm and is directly supported by over 40 asset allocation team members, teams conducting research in equities, fixed income, commodities, credit/currency as well as risk management and portfolio implementation. Three principals of the firm and members of the Risk Parity Investment Committee, Brian Hurst, Michael Mendelson, and Yao Hua Ooi, directly oversee portfolio management and strategy research. Note that as of July 2015, Brian Hurst has resumed his prior role as interim head of trading following Hitesh Mittal's departure from the firm. In June 2016, Isaac Chang, managing director, joined AQR as the co-head of Trading alongside Brian Hurst, Principal. In this role, he is responsible for managing the firm's trading operations across all asset classes and regions.

Senior Risk Parity Investment Committee Members JOHN LIEW, PH.D., FOUNDING PRINCIPAL

Prior to co-founding AQR, Mr. Liew was a portfolio manager in the Asset Management Division at Goldman, Sachs & Co. Prior to Goldman, he worked at Trout Trading Company. He is a member of the Board of Trustees of the University of Chicago where he received a Ph.D. in Finance. He has an MBA from the Booth School of Business and a B.A. in Economics.

JEREMY M. GETSON, CFA, PRINCIPAL

Jeremy is a senior member of AQR's Client Strategies team, working with and advising clients in the eastern half of the United States and all of Canada. Prior to AQR, he was a vice president of Allstate Financial and a consultant with Mercer Investment Consulting, advising pension plans on asset allocation and investment-manager selection. Jeremy earned an A.B. in politics from Princeton University, graduating cum laude, and an M.B.A. with high honors from the University of Chicago's Graduate School of Business.

BRIAN K. HURST, PRINCIPAL, RISK PARITY PORTFOLIO MANAGER (CURRENTLY CO-HEAD OF TRADING)

In addition to being a portfolio manager for two of AQR's macro strategies: managed futures and risk parity, Brian Hurst resumed his role in 2015 as head of trading following the departure of Hittesh Mittal. He has been at AQR since its founding and was named the 2013 Alternatives Fund Manager of the Year by Morningstar for his work on managed futures. Before AQR, Brian was an original member of the quantitative research group in the Asset Management division of Goldman, Sachs & Co. He began his career as a sell-side investment banking analyst



at Donaldson, Lufkin & Jenrette. Brian earned a B.S. in economics from the Wharton School of the University of Pennsylvania.

MICHAEL A. MENDELSON, PRINCIPAL, RISK PARITY PORTFOLIO MANAGER

Michael is portfolio manager of AQR's risk parity strategies and a member of both the firm's strategic planning and risk committees. Prior to AQR, Michael was a Managing Director at Goldman Sachs & Co., where he founded the quantitative trading group. Michael earned an S.B. in mathematics, an S.B. in management, an S.B. in chemical engineering and an S.M. in chemical engineering, all from the Massachusetts Institute of Technology, and an M.B.A. from the University of California at Los Angeles.

YAO HUA OOI, PRINCIPAL, RISK PARITY PORTFOLIO MANAGER

Yao Hua is a Principal in the Global Asset Allocation team, focusing on research and portfolio management of macrorelated strategies that include commodities, risk parity and managed futures. He was named the 2013 Alternatives Fund Manager of the Year by Morningstar for his work on managed futures, and shared the 2013 Whitebox Prize for his work on time series momentum. Yao Hua is an alumnus of the Jerome Fisher Program in Management and Technology at the University of Pennsylvania, where he earned a B.S. in economics and a B.S. in engineering, graduating summa cum laude in both.

SCOTT RICHARDSON, PH.D

Scott conducts research for AQR's Global Alternative Premia group, focusing on strategies that contain credit risk, and he helps oversee equity research for the firm's Global Stock Selection group. Prior to AQR, he was a professor at London Business School, where he still teaches M.B.A. and Ph.D. classes. He has held senior positions at BlackRock (Barclays Global Investors), including head of Europe equity research and head of global credit research, and began his career as an assistant professor at the University of Pennsylvania. He is a member of the Advisory Council of the AQR Asset Management Institute at London Business School and an editor of the Review of Accounting Studies, and he has published extensively there and in other leading academic and practitioner journals. In 2009, he won the Notable Contribution to Accounting award for his work on accrual reliability. Scott earned a B.Ec. with first-class honors from

the University of Sydney and a Ph.D. in business administration from the University of Michigan.

JOHN HUSS, VICE PRESIDENT

John is a senior researcher on AQR's Global Asset Allocation team and a portfolio manager for the firm's Risk Parity strategies. In these roles, he manages macroeconomic and portfolio construction research for Risk Parity and other asset allocation strategies. Prior to rejoining AQR, where he first worked from 2004 to 2008, he was a vice president in RBC's Global Arbitrage and Trading division and a systematic portfolio manager for Tudor Investment Corp. John earned a B.S. in mathematics from the Massachusetts Institute of Technology.

Process

Portfolio construction

The AQR approach to constructing a risk parity portfolio is threefold: (i) design risk buckets that have low correlation to each other, (ii) budget the total portfolio risk among and inside buckets, (iii) combine the buckets with the goal of creating a portfolio with the highest possible Sharpe ratio available. Each risk bucket provides roughly an equal risk contribution measured by beta to the total portfolio. Volatility of each risk bucket and individual asset classes are forecasted and cross-correlations between the different buckets are estimated with the understanding that adjustments to the asset class's notional weights may be required in order to keep the aggregate portfolio risk near the target level. Leverage is usually required to increase the notional exposure to asset classes with lower volatility, e.g., sovereign bonds, to equalize their contribution to total risk. The use of leverage will vary based on current market environment. While total fund leverage is capped at 300%, stress-test based exposure caps on asset classes may restrict leverage further, typically in the 250%-300% range for 10% volatility.

The AQR strategy attempts to maintain risk parity consistently, and uses a combination of short-term, medium-term, and long-term volatility and correlation forecasts and estimates. This is one of the main characteristics that differentiate AQR strategy from other risk parity providers, some of which use longer-term volatility and correlation measures. Three different risk models are used in portfolio construction. The top-level model is used to estimate correlation between the broad



asset classes. Two additional models are used to estimate correlations within buckets and volatility of each bucket.

To estimate cross-correlation between risk buckets AQR combines a short-term dynamic correlation matrix (500day equal-weighted) and a long-term static correlation matrix (historical data from 1980 to present). A 50%/50% blend of the two matrices provides a good tradeoff between sensitivity to market changes and relative stability of the estimates. Cross-correlation among different risk buckets is constrained at zero. The reason for imposing the constraint is that negative correlation could result in increased leverage in theoretically offsetting positions in equities and rates that could have to be unwound if correlations reverse.

To estimate correlations between individual assets inside buckets, a dynamic short-term correlation matrix is used (150-day center of mass, exponentially weighted). Exponential smoothing assigns exponentially decreasing weights over time and is commonly applied to financial market and economic data. The center of mass is the mean point of the distribution, or, in other words, the distribution is balanced around the center of mass.

Volatility is calculated as a weighted average of the shortterm volatility forecast and a long-term historic volatility. A higher weight of 80% is assigned to the short-term forecast (center of mass is equal to 25 trading days) to pick up changes in the short-term asset class volatility. A 20% long-term volatility component (center of mass is equal to 500 trading days) smoothers total volatility and reduces impact of market noise as well as decreases trading.

Risk buckets

The main criteria for an asset to be included in the portfolio are: (i) positive expected returns or significant diversification benefits; (ii) the asset class must maintain sufficient liquidity, and (iii) the ability to easily finance the position. Individual buckets are designed to minimize their correlation to each other. Market exposures are generally gained using exchange traded futures, vanilla fixed-floating interest rate swaps (for certain bond markets), and in a few cases, repo financing of cash bonds (e.g. inflation linked government bonds), a total of fifty five financial instruments.

Equity risk bucket

In the equity bucket, the strategy invests 70% in thirteen developed countries, 5% in US mid cap, 5% in US small cap, and 20% in seven emerging market futures. Both developed and emerging equities are weighted by capitalization. Equity exposure is generally achieved through index futures and, for Switzerland, Brazil, and Russia, swaps on futures.

Rates risk bucket

In the rates basket, the strategy invests in sovereign bonds of six developed countries: Australia, Canada, Germany, Japan, United Kingdom, and United States. The weights inside the bucket are 50%/50% GDP and market cap or issuance weighted. Fixed income exposure is achieved through 10-year government bond futures.

Inflation risk bucket

One third of the inflation risk bucket is invested into inflation-linked bonds of four developed countries: France, Germany, United Kingdom, and United States. AQR uses 5-year and 10-year inflation bonds. Inflation linked bonds are liquidity weighted, representing 50% US, 20% UK and 15% each of France and Germany. Inflation-linked bond exposure is achieved through direct holdings of bonds which are financed through repurchase agreements. TIPS total exposure is equally divided between 5 and 10 year issues.

The rest of the bucket is equally allocated between GCCI Commodity index (production weighted) and AQR Commodity Index (volatility weighted). Each index is invested in twenty three commodities and has equal total portfolio risk targets. Commodity exposures are obtained through futures.

Credit risk bucket (excluded from GRP-EL)

The credit risk bucket includes credit spreads for emerging sovereigns, as well as European and US high yield and investment grade indices. The manager achieves exposure from CDX rather than cash bonds due to liquidity. This bucket also includes emerging market currencies for: Brazil, China, Hungary, India, Mexico, Portland, Singapore, South Africa, South Korea, and Turkey.



Rebalancing

In order to determine if rebalancing the portfolio is necessary, the team will examine how far the current positions are from the desired notional positions. This is done by comparing the change in volatility of the position before and after the proposed trade. For example, if the model calculates a desired notional amount of \$1000 in production weighted commodities, then the trade will be placed when actual position falls below \$950 or goes above \$1050. The threshold is 5% of the desired position size (not 5% of the NAV of the fund) for the most highly liquid instruments (for instance, developed stocks and bonds) and 10% for other strategies such as TIPS and emerging equities.

Tactical positioning (only relevant for AQR GRPT and GRPT-EL vehicles)

Similar to many competitors, AQR also offers tactical versions of their risk parity products; however, assets in these vehicles has been relatively small compared to their standard risk parity products. With the tactical portfolios, the manager seeks to use additional signals: value, carry, momentum, and trend-following. Active asset allocation allows the manager to tilt toward views where signals align – note that the impact of the tactical view is structured to be marginal, with about a 2% tracking error, and the tactical funds retain their core risk allocations.

Risk Management

AQR devotes substantial resources to market, financial and operational risk management. The 8-person Risk Management team is led by Lars Nielsen, the AQR's new Chief Risk Officer, after Aaron Brown transitioned to the Head of Financial Market Research in March 2016. The Risk Management team is independent and external to portfolio management and reports directly to Cliff Asness. This team reviews portfolio risks, liquidity and trading instruments on a daily basis. There is also a dedicated Counterparty Credit Officer and firm-wide Counterparty Credit Committee that reviews quality and exposures to all trading partners. The firm's operational and control procedures are among the most robust in the industry.

For all long-only products, the following characteristics are monitored on a daily basis: forecasted correlation between assets and asset classes/risk buckets, worst and best case analysis, scenario analysis, position limits. Monthly client reports display Fund returns, attribution, and risk allocation.

More specifically, for the GRP strategy, AQR employs a portfolio monitoring program that includes the following measures:

(1) Daily assessment of individual asset risk forecasts and ex-ante risk budget to

- Capture changes in the underlying risks of the portfolio holdings
- Minimize transaction costs

(2) Systematic drawdown control process and tail risk assessment to

- Adjust notional exposures according to the current risk forecasts
- Overlay fund risk models with external measurement and control on portfolio risk

(3) Strict oversight of counterparties by AQR Counterparty and Risk Committees

- Collateral management program mitigates exposures to counterparties
- Majority of fund capital is held in cash instruments away from trading and financing counterparties

Drawdown Control

The drawdown control/stop loss mechanism is a rulesbased, systematic risk-mitigating process that is designed to limit the maximum total portfolio drawdown to 15% and to reduce the total portfolio volatility in a stair-step manner during periods of heightened market volatility often seen as preceding material market corrections. Drawdown control is designed to incrementally decrease the total portfolio volatility to as low as 50% of target portfolio volatility. Portfolio risk is reduced pro-rata among the risk buckets. When market volatility is observed to decline, total portfolio volatility is gradually increased back towards the target level, again utilizing a rules-based systematic approach. Risk control is separated from portfolio construction and controlled by the Chief Risk Officer. Manual overrides are possible under very extreme market or economic conditions.

Historically, drawdown control has only been triggered during 2008/09 financial crisis with total portfolio volatility remaining below the target level for roughly a year. At the peak of the crisis the portfolio was completely unlevered. Recently, the drawdown control was triggered for a second time during the second quarter of 2013 following the Taper Tantrum.



Potential Concerns

Because the Fund is levered, it potentially faces two important risks: (1) risk of exceptionally large market moves and (2) availability of financing. We believe that these risks are mitigated by a thoughtful portfolio design and selection of liquid financial instruments to achieve desired exposures. Total fund leverage is capped at 300% (at 10% volatility) so the fund does not become over levered if market volatility declines. There is also a drawdown control mechanism that reduces total portfolio risk and leverage in a systematic manner if market conditions deteriorate. To further control risk, maximum total portfolio drawdown is limited to 15%.

The portfolio is mostly invested in liquid derivatives instruments and requires only a fraction of original investment to achieve desired notional exposures. The remainder is kept in cash and is managed in third-party institutional money market funds or in FDIC fully-insured bank accounts. AQR utilizes International Fund Services (a State Street Company) as the Fund administrator, PWC as the Fund auditor, and multiple prime brokers including Morgan Stanley, JP Morgan, and Goldman Sachs. In addition, AQR also maintains liquidity funds segregated from financing sources and seeks to maintain appropriate cash balances.

Management of asset growth, capacity, and resources may also be a challenge. As AQR has been active in new launches and strategies, capacity of strategies in existing products should be assessed. The firm has been proactive by soft-closing some funds, including DELTA. Additionally, as researchers may cover many different products, allocation of research and development may vary across products.

In August 2015 Hitesh Mittal, AQR's head of trading was let go following the announcement of a pending SEC settlement with his former employer, ITG, a dark pool operator after the media cited unidentified sources pointing at his role at his prior firm. While Mr. Mittal had not been identified explicitly by the SEC or ITG, and the investigation does not involve AQR, the firm believed that his continued employment could be a distraction given the uncertainty of outcomes. Brian Hurst has since resumed his prior role as interim head of trading until the firm finds a replacement. In June 2016, AQR hired Isaac Chang as the Co-head of Trading to work alongside with Brian, with the expectation that Brian will spend more time focusing on non-trading related activities as Isaac's responsibilities grow.

Performance

AQR's GRP strategy with a targeted volatility of 10% has an expected annualized return of 5% over T-Bill. The expected gross Sharpe Ratio for the GRP portfolio is approximately 0.5 over the long term. On a realized basis, since 2006 the 10% volatility strategy has returned an annualized 6.1% return with 9.2% volatility, or a 0.6 Sharpe Ratio. Over the same period, a 60/40 portfolio of 60% MSCI ACWI, 40% Barclays Global Aggregate bonds would have had a return of about 4.7% on a volatility of 11.0%, for a Sharpe Ratio of 0.4.

A three-bucket GRP-EL strategy currently available to the new investors delivered 4.1% gross of fees return with 7.7% realized volatility since inception in October 2011.

In certain economic scenarios, such as recession or moderate deflation accompanied by low economic growth, AQR expects its GRP strategy to realize negative returns. However, GRP strategy is still expected to outperform a balanced benchmark of 60% MSCI ACWI and 40% Barclays Global Aggregate indices under such market conditions.

Fund Terms

There are several risk parity products that target different levels of total portfolio risk.

10% target volatility

- (1) AQR GRP EL 10 Offshore Fund Ltd. Commingled/weekly liquidity/38 bps
- (2) AQR GRP EL Fund, L.P. Commingled/weekly liquidity/38 bps
- (3) Risk Parity CIT CIT/ daily liquidity /tiered
- 12% target volatility
- AQR GRP EL 12 Offshore Fund Ltd.

Commingled/weekly liquidity/46 bps

20% target volatility

AQR GRP EL 20 Offshore Fund Ltd. Commingled/weekly liquidity/76 bps

AQR GRP EL 20 (Lux) Fund Lux Fund/daily liquidity/76 bps



The 15% target volatility product has tactical tilts and is offered through a mutual fund vehicle. Based on client request, AQR could launch new commingled funds if economically justified.

Recommendation

Verus believes that AQR Global Risk Premium is an efficient low-cost beta allocation strategy based on rigorous fundamental research. AQR has been continuously conducting new research and strategy enhancements to the program since its 2006 launch. It is one of few risk parity strategies tested in 2008/2009 financial crisis and proved to be robust. Additionally, AQR is committed to providing clients with full transparency and liquidity, and have been thought leaders in research with a team having strong academic and practitioner pedigrees.

The strategy is managed to maintain risk balance among different asset classes and in an effort to maintain the total portfolio risk level as steady as possible.

Verus believes that the AQR Global Risk Premium is an appropriate vehicle for clients to use for risk parity exposure in their portfolios.

The material may include estimates, outlooks, projections and other "forward-looking statements." Due to a variety of factors, actual events may differ significantly from those presented. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

This report is provided for informational purposes only and nothing herein constitutes investment, legal, accounting or tax advice, or a recommendation to buy, sell or hold a security or pursue a particular investment strategy. The information in this report reflects prevailing market conditions and our judgment as of this date, which are subject to change. This information is obtained from sources deemed reliable, but there is no representation or warranty as to its accuracy, completeness or reliability.



Manager Evaluation

PanAgora Asset Management Risk Parity Multi Asset

STRATEGY BASICS

Asset Class:	Risk Diversified Fund
Investment Style:	Risk Parity
Firm Inception:	1989
Firm Assets:	\$42.8 Billion
Strategy Inception:	2006
Strategy Assets:	\$8.5 Billion
Min. Investment:	\$3 Million
Commingled	35 bps for 10% volatility, scales
Vehicle Fees:	with volatility
Separate Account:	\$100 Million min, 35 bps

Firm Background and History

PanAgora has been providing investment management services since it began operations as the Structured Investment Products Group of The Boston Company in July 1985. PanAgora Asset Management, Inc. subsequently registered as an independent investment adviser with the SEC in November 1989. At that time, the company was owned by The Boston Company and Nippon Life Insurance Company (NLI) each owning 50% of the company. In September 1992, The Boston Company was sold and its 50% ownership interest reverted to its parent organization, Lehman Brothers. Putnam Investments acquired Lehman Brothers' 50% position in February 1998 and subsequently purchased an additional 30% interest from NLI in 2004.

Today PanAgora is a provider of investment solutions spanning a broad array of asset classes and risk targets. In March 2008 PanAgora implemented a Management Equity Plan that offers employees up to 20% ownership in the firm through restricted stock and options. If all employee stock and options were issued and exercised, the outside ownership would be a 66% holding by Power Financial

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Corporation (through its affiliates Great West Life/Putnam Investments) and 14% held by Nippon Life.

PanAgora's investment teams are organized into an Equity Strategies group and a Multi Asset Strategies group. PanAgora's investment offerings include Alternatives, Risk Premia and Traditional Long-Only strategies.

Strategy Background

The PanAgora Risk Parity Multi Asset investment strategy is based on the belief that diversification is the key to generating better risk-adjusted returns, and that avoiding risk concentration is the best way to achieve true diversification. The strategic balancing of risk within a portfolio is commonly referred to as a risk parity or riskbalanced approach to investment. Risk parity strategies are seen as providing a more balanced approach to gaining exposures to different return drivers than traditional equity centric portfolios. For example, within a traditional capital allocated portfolio with an allocation of 60% equity/40% bonds over 90% of the total portfolio volatility is due to equity risk.

In order to generate stable returns under a broad array of market and economic conditions the Multi Asset investment team attempts to balance the portfolio across the dimensions of risk that they believe exert the greatest influence on performance over time. The Risk Parity Multi Asset strategy seeks to participate in periods of economic growth by allocating to equity market risk premia and to preserve capital during economic contraction by allocating to nominal fixed income risk premia while commodities and inflation linked bonds provide an element of inflation protection. The strategy is designed to achieve stable wealth creation by building a portfolio that would perform well across various economic environments.

The main premise of PanAgora's approach to risk parity portfolio construction is that risk should be allocated to



investment opportunities in relation to their long-term risk-adjusted returns (Sharpe Ratios), and that the Sharpe Ratios of certain securities and/or groups of securities, such as equities and bonds, or sectors and countries within an equity or fixed income benchmark, are similar over the long-term. The firm believes that its research shows that stock and bond long-term Sharpe ratios are about equal to each other, while commodities have a lower rate of riskadjusted returns. Consequently, the strategic risk allocation is 40% to an economic growth sensitive portfolio /40% in an economic contraction sensitive portfolio /20% in an inflationary regime sensitive portfolio. On a relative basis, the portfolio tends to have a smaller weighting to inflation-sensitive assets compared to other well known risk parity programs. The strategy targets 10% target volatility, but could be run for levels of total risk from 5%-25%.

The team is continuously conducting research to improve the investment process. Since its inception in 2006 the strategy has undergone two important enhancements in portfolio construction. First, in 2008, a Dynamic Risk Allocation (DRA) technique was implemented to apply tactical tilts to the strategic allocation based on technical/behavioral signals, momentum and reversal. In 2011, a fundamental component, relative sub-asset class valuations, was included as one of the variables in DRA process. A bottom-up risk parity approach was implemented inside several asset classes from 2008 to 2011 to maximize diversification by mitigating risk concentration across multiple dimensions. Equity bucket is risk-diversified by sector, country, and stock. Sovereign rates exposure is diversified by country, term structure, and credit ranking; commodities – by sector and security.

In order to increase the notional exposure of lower risk asset classes such as sovereign bonds, leverage is usually required to equalize their contribution to total risk. The amount of leverage varies substantially over time as a function of the relative volatility of different risk buckets comprising the portfolio and correlations between them. Since inception of the strategy leverage has been between 180% and 285%. For the portfolio targeting 10% volatility, leverage is capped at 350%.

The strategy does not have explicit drawdown control or a stop-loss mechanism, as PanAgora believes that their research showed that a bottom-up risk parity approach and DRA mechanism should mitigate portfolio risk and provide good downside protection. However, the investment committee has discretion in forcing a rebalance or de-risking as a result of exogenous market factors, for example during the Taper Tantrum of May/June 2013.

Key Investment Professionals

The Risk Parity strategy is managed by the Multi Asset investment team of 12 investment professionals led by Dr. Qian. The team is responsible for the development and management of top down strategies for both active market returns and market neutral, true alpha, strategies. Edward Qian, the lead portfolio manager and CIO of the Multi Asset group, is ultimately responsible for the decisions in these portfolios.

EDWARD QIAN, PH.D., CFA, CIO & HEAD OF RESEARCH, MULTI ASSET

Dr. Qian's primary responsibilities include investment research and portfolio management in PanAgora's Multi Asset group. He has been with PanAgora since 1997. Prior to joining PanAgora, Dr. Qian was a Portfolio Manager and part of the Asset Allocation team at 2100 Capital, an alternative investment firm. His prior experience includes a role as Senior Asset Allocation Analyst of Putnam Investments' Global Asset Allocation team. Before joining Putnam, he was a fixed income Quantitative Analyst at Back Bay Advisors. He is also the co-author of many articles regarding quantitative investment. Dr. Qian earned a B.S. from Peking University, M.S. from the Chinese Science Academy, and a Ph.D. from the Florida State University.

BRYAN BELTON, CFA, DIRECTOR, MULTI ASSET

Mr. Belton is responsible for research as well as the daily management of the firm's Diversified Risk, global fixed income, currency, and commodity portfolios. Mr. Belton is a member of the firm's Directors Committee. Prior to joining PanAgora in 2005 Mr. Belton was the Investment Portfolio Officer at the Federal Home Loan Bank of Boston. In that role, he was responsible for actively managing and hedging all of the Bank's long-term investment portfolios. Before joining the Federal Home Loan Bank of Boston, Mr. Belton was a Senior Manager at Investors Bank & Trust Company. He earned an A.B. from Boston College and M.S.F. from Northeastern University.



MARK BARNES, PH.D., DIRECTOR, MULTI ASSET

Dr. Barnes is responsible for quantitative model research, development, and enhancements for PanAgora's emerging and developed equity strategies. He is also involved in research on the Diversified Risk equity strategy. Prior to joining PanAgora in 1999, he worked for Manhattan Funds (now Weiss Asset Management) which specialized in emerging market investments. Dr. Barnes earned a B.A. from John Hopkins University, an M.A. from the University of Texas, and an M.A. and Ph.D. from Boston University.

DAVID LIDDELL, DIRECTOR, MULTI ASSET

Mr. Liddell primary responsibility is management of the group's emerging equity strategies. He joined PanAgora in 1989. Mr. Liddell's prior responsibilities included management of PanAgora's Global Equity, U.S. Small Cap, and U.S. Asset Allocation products. Mr. Liddell is a member of PanAgora's Directors Committee as well as the firm's Trading and Investment Practices Committee. Prior to joining PanAgora, Mr. Liddell worked in the domestic custody fixed income division at The Boston Company. He earned a B.A. from St. Lawrence University and MBA from Boston College.

WILLIAM ZINK, DIRECTOR, MULTI ASSET

Mr. Zink is responsible for developing and evaluating trading strategies and has over 15 years of experience trading derivative securities, including financial futures and exchange traded funds. He is a member of the Directors Committee. Prior to joining PanAgora in 1988, Mr. Zink was Vice President in charge of portfolio management and mutual fund pricing businesses at Interactive Data Corporation. He earned an S.B. and S.M. from Massachusetts Institute of Technology.

JONATHAN BEAULIEU, CFA, PORTFOLIO MANAGER, MULTI ASSET

Mr. Beaulieu is a Portfolio Manager within the Multi Asset group. He is responsible for the daily management of the firm's Risk Parity Multi Asset Portfolios. He also assists with the management of the firm's domestic and global fixed income portfolios. Prior to joining PanAgora, Mr. Beaulieu was responsible for actively managing and hedging fixed income portfolios at the Federal Home Loan Bank of Boston. Before joining the Federal Home Loan Bank of Boston, Mr. Beaulieu was a Quantitative Analyst at MFS Investment Management.

Process

Portfolio Construction

PanAgora's Risk Parity Multi Asset investment process is systematic and uses a proprietary risk-budgeting framework to construct diversified portfolios within and across a wide range of asset classes. The strategy follows a four-step investment process. This process includes a strategic component aimed at minimizing risk concentration in multiple dimensions to generate better long-term risk-adjusted returns over time, and a tactical component (DRA) that enhances returns while providing additional dampening of volatility and increased downside protection.

(i) Select appropriate asset classes.

The strategy uses asset classes that are complementary to one another (have low correlation and are expected to perform differently in different economic environments) and avoids assets that have significant liquidity and tail risk. Developed and emerging markets equity has high correlations with capital growth while sovereign fixed income and investment-grade credit have high correlations with capital protection. Asset classes such as commodities and inflation-linked securities add an element of inflation protection to the aggregate mix. These assets serve as the strategy construction blocks. On the other hand, while asset classes such as high yield fixed income, emerging market debt, and private equity may offer some additional diversification benefits, they tend to be correlated with capital growth, similar to global equities and also introduce significant liquidity and tail risk. PanAgora excludes these asset classes from its risk parity portfolio.

(ii) Build asset class exposures with diversified risk.

The simplest way to capture global equity risk premium is to invest in a broad-based global equity benchmark such as the MSCI. This index has over 1,600 securities and is invested in more than 20 different countries. However, three countries, U.S., U.K., and Japan, currently account for about 70% of the index's total risk. Risk concentration across the country dimension is thought to unnecessarily expose a portfolio to unpredictable country-specific risk such as political risk, demographic risk, or geographic risk. Country-specific shocks are impossible to predict and



investors are believed not to be compensated for having country risk concentration in their portfolio.

Although country concentration risk seems to be the most obvious, the most important area of risk concentration is believed to be the sector dimension. Three cyclical sectors, Financials, Technology, and Industrials, account for about 50% of MSCI World Index risk budget. The risk is mainly concentrated across the cyclical versus defensive thematic dimension that expose portfolios to growth risk across the world. Globalization of trade and capital has caused the synchronization of the business cycles of many countries. Risk concentration in the cyclical sectors of cap-weighted indices has resulted in large drawdowns when the global economy weakened and has lowered risk adjusted returns over the long-term. PanAgora believes that their research showed that balancing contribution to risk across sectors reduces sector risk concentration and directionality across the economic growth as well as the "risk-on, risk-off" dimensions and hedges out some of the systematic directionality inherent in equity risk premium. Finally, similar to county and sector dimension, cap-weighted indices are also concentrated across individual stocks. The top 15% of the index holdings account for over 60% of the index's total risk.

To mitigate risk concentration in countries, sectors, individual securities equity bucket is risk diversified along these three dimensions. Based on similar research, sovereign rates exposure is diversified by country, term structure, and credit ranking; commodities – by sector and security.

(iii) Strategically weight long-term exposures to asset classes.

Risk is allocated across asset classes based on each asset class' long-term Sharpe Ratio and expected contribution to the portfolio's aggregate risk. A 5-year half-life covariance matrix is used to determined cross-correlations between different risk buckets. This means that an observation that occurred 5 years ago would get half of the weight of the current observation. This approach is believed to provide relative stability of the estimate while giving higher weight to more recent history.

(iv) Tactically re-weight exposures using DRA mechanism

Due to changing market and investor behavior Sharpe ratios of financial assets often deviate from the long-term equilibrium. PanAgora deploys the Dynamic Risk Allocation framework to make tactical shifts across several dimensions in the portfolio.

Dynamic Risk Allocation

DRA is a systematic process that uses a combination of early stage momentum, late stage reversal, and a valuation metric to identify and capitalize on intermediateterm investment opportunities. Since the tactical shifts are risk based, they are determined by forecasting relative risk adjusted returns (Sharpe ratios) rather than forecasting relative returns. DRA is applied across the buckets, across sub-asset classes, and within certain asset classes.

While the strategy's tactical tilts are constrained around a boundary of +/- 15%, the shift in risk exposures is typically closer to +/-5% from their strategic targets. The active tracking error of the entire impact of DRA is about 1.5%-2% annualized.

Implementation and Trading

In order to implement bottom-up risk parity approach within the buckets, the strategy invests in physical assets in many sub-asset classes to achieve the desired level of diversification. Physicals are used to invest in global, small cap and emerging markets equities as well as credit and inflation-linked bonds. A small percentage in each subasset class is invested in futures to simplify monthly rebalancing and trading. U.S. and non-U.S. rates exposures and commodities exposures are gained through futures.

Risk Management

The portfolio holds 25-50% in cash. While most risk parity providers implement portfolios mostly through derivatives and as a result have higher cash positions, the use of bottom-up diversification and physical single name equities takes up cash. However, the amount of cash is adequate to meet all necessary margin requirements. In addition, the bottom-up risk parity approach and Dynamic Risk Allocation is expected to lower draw downs.

Performance of the accounts is reviewed daily, as well as Value-at-Risk (VAR) and daily portfolio stress testing. A 5% drawdown would prompt the Investment Committee to meet, which may lead to portfolio rebalancing or derisking the portfolio. Total portfolio risk is expected to be within 8%-10% range. Limits are also set on total leverage for rates exposure.

Potential Concerns

Because the strategy is levered, it potentially faces two important risks: (1) the risk of exceptionally large market moves and (2) the availability of financing. We believe that these risks are mitigated by a thoughtful portfolio design, including bottom-up risk parity and DRA that provide additional diversification and reduce drawdowns, and the fact that 25-50% of portfolio holdings are in cash.

There is key-man risk associated with the strategy as Mr. Qian is the ultimate decision maker. However, the depth of the team and a long track record of many teammembers with PanAgora (and previously with Putnam) are good guarantors of stability and a depth and width of talent and experience in the team as well as in the entire firm. The firm publishes Investment Insights covering new research in the area, and these pieces are often created by a combination of collaborators within the group, rather than a single author.

The two important portfolio enhancements, bottom-up risk parity and Dynamic Risk Allocation were introduced after the 2008/09 financial crises and the enhanced product has not been tested during a major market correction. It is worth noting that the strategy held up quite well in the second quarter of 2013. It was down by 7% for the quarter while some of the competitors experience the drawdown of twice the size.

Performance

PanAgora Risk Parity Multi Asset portfolio with a targeted volatility of 10% has an expected annualized return of 7% - 10% plus cash. The expected Sharpe Ratio for a portfolio deploying the standard Risk Parity Multi Asset strategy is between 0.7 and 1.0. Since its inception in January 2006, the Risk Parity Multi Asset strategy has outperformed a balanced benchmark of 60% MSCI ACWI and 40% Barclays

Global Aggregate indices at lower levels of risk, with returns of 6.9% with realized volatility of 9.5%, compared to 4.7% annualized return with a volatility of 11.0% for the 60 equity /40 bond allocation. The strategy's structural underweight exposure to inflation risk meant that it was able to avoid some losses from the commodities sell-off of 2014/2015, although participation in an inflation rally recovery relative to peers would also be mitigated.

In absolute terms, PanAgora's Risk Parity Multi Asset strategy may experience negative returns in periods when each of the asset classes used in the strategy (including equity, fixed income and commodities) experience negative returns; however, the frequency of such an occurrence is limited and generally short-lived.

Recommendation

Verus believes that the PanAgora Risk Parity Multi Asset strategy is a well-designed risk-balanced strategy based on sound fundamental principles. PanAgora launched its first risk parity strategy at the beginning of 2006. The multi asset team has been continuously conducting research to improve and enhance the investment process. The strategy was tested in the 2008/2009 financial crisis and proved to be robust. Additionally, PanAgora is committed to providing clients with full transparency and liquidity.

The strategy is actively managed to maintain risk balance among different risk buckets to keep the total portfolio risk level in 8%-10% range. Dynamic Risk Allocation is part of the portfolio construction process used to identify and capitalize on intermediate-term investment opportunities and enhance returns, while providing additional dampening of volatility and increased downside protection.



This report is provided for informational purposes only and nothing herein constitutes investment, legal, accounting or tax advice, or a recommendation to buy, sell or hold a security or pursue a particular investment strategy. The information in this report reflects prevailing market conditions and our judgment as of this date, which are subject to change. This information is obtained from sources deemed reliable, but there is no representation or warranty as to its accuracy, completeness or reliability.

The material may include estimates, outlooks, projections and other "forward-looking statements." Due to a variety of factors, actual events may differ significantly from those presented. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**
Next steps



Next steps

- The Board should direct Staff and Verus to conduct on-site due diligence with selected investment managers, determine portfolio structure, and present a final recommendation to the Board at the April meeting.
 - Finalists to present at April Board meeting.



Appendix I – Search Book





PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

February 2017 Risk Parity Search Prepared for **Stanislaus County Employees' Retirement Association**



I. Manager overview



Manager comparison

	AQR Capital	PanAgora	First Quadrant
FIRM OWNERSHIP	70% employee owned, 30% owned by AMG	20% employee owned, 80% owned by Great West Life/Putnam Investments and Nippon Life Insurance Company	25% employee owned, 75% owned by AMG
FIRM NAME	AQR Capital Management LLC	PanAgora Asset Management, Inc.	First Quadrant L.P.
PRODUCT NAME	Global Risk Premium - EL	Risk Parity Multi Asset	FQ Essential Beta
FIRM TOTAL AUM (\$MM)	\$175,211	\$42,800	\$22,183
STRATEGY AUM (\$MM)	\$13,031**	\$8,493	\$2,233
INCEPTION DATE	Oct-11*	Jan-06	Mar-09
RISK TARGET	10%	10%	10%

*AQR launched its first Risk Parity strategy, AQR GRP, in January 2006. AQR GRP-EL (Enhanced Liquidity) was launched in October 2011. Returns shown for AQR GRP-EL prior to October 2011 represent actual AQR GRP returns adjusted to simulate constraints in place for GRP-EL product.

**Figure represents AUM for specific GRP-EL only. Total Risk Parity assets for AQR as of 12/31/16 are \$26.2 billion.



Investment vehicle information

	INVESTMENT VEHICLES	MINIMUM INVESTMENT	EXPENSE RATIO	FEE SCHEDULE	OTHER FEES	LIQUIDITY
AQR Capital	Commingled Fund	\$5,000,000	0.38%	All Assets	None	Weekly
	Mutual Fund (QRMIX)	\$5,000,000	0.95%	All Assets	None	Daily
PanAgora	Separate Account	\$100,000,000	0.35%	All Assets	Custody Fee	Monthly
	Commingled Fund	\$3,000,000	0.35%	All Assets	None	Monthly
First	Separate Account	\$50,000,000	0.40% 0.35% 0.20%	First \$100MM Next \$250MM Above \$350MM	None	Monthly
Quadrant	Commingled Fund	\$1,000,000	0.40% 0.35% 0.20%	First \$100MM Next \$250MM Above \$350MM	None	Monthly



Performance to date - as of December 2016

AQR Capital PanAgora First Quadrant 60/40 Global Portfolio



EXCESS ANNUALIZED RETURN TO DATE, %	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
AQR Capital	5.6	5.6	0.3	-2.9	1.5	3.4
PanAgora	8.3	8.3	5.7	2.1	4.5	3.8
First Quadrant	9.0	9.0	0.7	-3.3	0.2	

PERFORMANCE TO DATE



Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Calendar year performance

AQR Capital PanAgora First Quadrant 60/40 Global Portfolio



ANNUAL PERFORMANCE



Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Performance summary - as of December 2016

	AQR Capital	PanAgora	First Quadrant	60/40 Global Portfolio
Statistics (5 Years)				
Annualized Return, %	3.5	8.4	3.1	6.4
Annualized StdDev, %	7.8	8.5	8.9	7.5
Sharpe Ratio	0.5	1.0	0.4	0.9
Avg Loss, %	-1.9	-1.9	-2.1	-1.6
Loss Frequency, %	40.0	36.7	40.0	40.0
Max Drawdown Return, %	-14.3	-9.4	-16.1	-7.2
Max Drawdown Period	Sep-14 - Dec-15	May-13 - Jun-13	Sep-14 - Jan-16	Sep-14 - Jan-16
Recovery Period	Jan-16 - Sep-16	Jul-13 - Feb-14	Feb-16 - Sep-16	Feb-16 - Jul-16
Skewness	-0.7	-0.5	-0.5	-0.2
Excess Kurtosis	0.0	1.3	0.4	
Returns to Date				
1 Year	11.1	13.7	14.5	5.5
3 Year	2.7	8.0	3.1	2.3
5 Year	3.5	8.4	3.1	6.4
7 Year	7.3	10.3	6.0	5.7
10 Year	7.3	7.7		3.9
Common (Mar-09)	8.9	11.2	8.2	9.6
Calendar Year Returns				
2016	11.1	13.7	14.5	5.5
2015	(9.0)	(3.5)	(8.3)	(1.6)
2014	7.0	14.9	4.2	3.2
2013	(2.4)	3.6	(1.5)	14.2
2012	12.3	14.7	8.1	11.3
2011	12.7	11.3	9.0	(0.9)
2010	22.3	18.8	18.1	9.6
2009	14.0	7.2		20.7
2008	(7.4)	(13.4)		(24.9)
2007	17.0	14.4		9.4
2006	3.4	(1.2)		14.6



II. Strategy detail



Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Strategy overview - AQR Capital



INVESTMENT PHILOSOPHY	 Capture return drivers or risk premia derived from exposures to traditional asset classes: equity, rates, TIPS and commodities Belief that the risk parity approach maximizes the diversification benefit across a broad range of economic environments
PORTFOLIO CONSTRUCTION	 Targets an equal risk contribution from each of the three main risk buckets: equities, rates, and inflation Uses leverage to achieve equal risk weights for asset classes with different volatilities Total fund leverage is capped at 300% gross notional exposure
TEAM DESCRIPTION	 Investment committee is comprised of seven senior members of the firm and supported by over 40 asset allocation team members Three principals of the firm and members of the risk parity investment committee, Brian Hurst, Michael Mendelson, and Yao Hua Ooi, directly oversee portfolio management and strategy research



Strategy overview - AQR Capital



12 MONTH EXCESS PERFORMANCE VS. BENCHMARK, DEC-06 TO DEC-16



HISTORICAL ASSET EXPOSURE

PERFORMANCE SENSITIVITY	 The strategy will underperform if there is a sharp increase in rates or downtrend in commodities, or when most asset classes experience negative returns simultaneously
DIFFERENTIATING CHARACTERISTICS	 This risk parity product does not rely on any tactical tilts to generate alpha Explicit drawdown control mechanism that attempts to limit the maximum drawdown to 15% Drawdown mechanism may cut total portfolio risk up to 50% depending on market situation
POTENTIAL CONCERNS	 Because the Fund is levered, it potentially faces two important risks: (1) risk of exceptionally large market moves and (2) availability of financing. We believe that these risks are mitigated by a thoughtful portfolio design and selection of liquid financial instruments to achieve desired exposures. In August 2015 Hitesh Mittal, AQR's head of trading was let go following the announcement of a pending SEC settlement with his former employer, ITG. Brian Hurst has since resumed his prior role as interim head of trading until the firm finds a replacement. In June 2016, AQR hired Isaac Chang as the Co-head of Trading to work alongside with Mr. Hurst, with the expectation that Mr. Hurst will spend more time focusing on non-trading related activities as Mr. Chang's responsibilities grow.



Strategy overview - PanAgora



AUM GROWTH



INVESTMENT PHILOSOPHY	 Capture market risk premia by investing across assets with positive expected returns in a way that mazimizes the diversification benefit during various market environments Avoid risk concentration to maximize impact of compounding returns through positive and negative economic growth surprises, as well as inflationary periods
PORTFOLIO CONSTRUCTION	 Uses a proprietary risk-budgeting framework to perform a 4 step process: select asset classes, diversify risks, set the strategic allocation, and use tactical tilts driven by Dynamic Risk Allocation (DRA) processes. Targets 10% annualized volatility with maximum leverage of 350% gross notional exposure Employs a bottom-up approach to diversification by balancing risk across and within asset classes
TEAM DESCRIPTION	 Multi Asset investment team of 12 investment professionals is led by Dr. Qian, who is the lead portfolio manager and CIO of the Multi Asset Group



Strategy overview - PanAgora



12 MONTH EXCESS PERFORMANCE VS. BENCHMARK, DEC-06 TO DEC-16



HISTORICAL ASSET EXPOSURE

PERFORMANCE SENSITIVITY	 The strategy will underperform if there is a sharp increase in rates, or when most asset classes experience negative returns simultaneously
DIFFERENTIATING CHARACTERISTICS	 Tactical changes driven by the DRA are an attempt to capitalize on intermediate-term opportunities using technical, behavioral, and fundamental signals Investment committee has discretion to force a rebalance or de-risk the portfolio as a result of exogenous events, such as the Taper Tantrum in 2013
POTENTIAL CONCERNS	 The use of leverage introduces two important risks: (1) risk of exceptionally large market moves and (2) availability of financing. The volatility is mitigated through the fund's implementaion of tactical tilts driven by Dynamic Risk Allocation (DRA). Does not have explicit drawdown control or a stop-loss mechanism, as their research showed that a bottom-up risk parity approach and DRA mechanism may mitigate portfolio risk and provide good downside protection There is key-man risk associated with the strategy as Mr. Qian is the ultimate decision maker. However, the depth of the team and a long track record of many team-members with PanAgora (and previously with Putnam) are good guarantors of stability and a depth and experience in the team.



Strategy overview - First Quadrant



INVESTMENT PHILOSOPHY- Achieve long term returns comparable to a diversified equity portfolio with smaller drawdowns, less volatility, and lower
correlation to equities
- Participate in global economic growth regardless of business cycle
- Adjust risk diversification depending on level of uncertainty in the marketPORTFOLIO CONSTRUCTION- Three steps: Balance risk 1) across risk buckets, 2) within risk buckets, and 3) over time
- Proprietary Market Risk Index "MRI" measures investor sentiment and fundamental economic variables to move between
specific portfolio allocations for "fragile" and "resilient" market states
- Holds equity indexes, credit bonds, real estate and emerging markets to participate in real economic growth, and commodities
and TIPS are held for inflation protectionTEAM DESCRIPTION- Ed Peters is architect and lead PM for Essential Beta, formerly CIO of PanAgora
- Supported by 7 senior investment professionals that provide support for model building, risk measurement, risk allocation,
portfolio optimization, as well as new research initiatives



Strategy overview - First Quadrant



12 MONTH EXCESS PERFORMANCE VS. BENCHMARK, FEB-10 TO DEC-16



PERFORMANCE SENSITIVITY	 The strategy is designed to achieve long-term equity like returns but could underperform should levered exposures (rates, TIPS) move downward sharply or when majority of asset classes experience negative returns simultaneously
DIFFERENTIATING CHARACTERISTICS	 Use of synthetic zero coupon bonds and equity index options for tail-risk hedging Recent and older data is weighted equally; most providers incorporate some form of time decay for data inputs Non-Model Driven Action ("NMDA") allows team to jointly decide to override model outputs when exogenous events occur that model may not incorporate, such as political shocks, global catastrophes, etc.
POTENTIAL CONCERNS	 Ed Peters is the lead PM and in his mid-60s - should he retire (no stated intent to for the time being) some changes are possible. However, the team is experienced and the CIO Max Darnell has overseen the development and management of the strategy from its inception. The team can override model-driven allocations and has done so a handful of times over last several years, the impact and merits of these decisions can be hard to measure but are intended to help minimize specific event risk (e.g., Fukushima 2011) Because the Fund is levered, it potentially faces two important risks: (1) risk of exceptionally large market moves and (2) availability of financing. We believe that these risks are mitigated by thoughtful portfolio design and using only the most liquid financial instruments to achieve desired exposure.



III. Appendix



Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Performance statistics

AQR Capital PanAgora First Quadrant 60/40 Global Portfolio



EXCESS PERFORMANCE VS. RISK, MAR-09 TO DEC-16

36 MONTH ROLLING BETA TO MSCI WORLD, DEC-08 TO DEC-16





MAX DRAWDOWN RETURN, MAR-09 TO DEC-16



36 MONTH ROLLING BETA TO BARCLAYS GLOBAL AGG, DEC-08 TO DEC-16



Verus⁷⁷

Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Risk and correlation - as of December 2016

AQR Capital PanAgora First Quadrant 60/40 Global Portfolio

36 MONTH ROLLING RISK, DEC-08 TO DEC-16



36 MONTH ROLLING CORRELATION TO GLOBAL 60/40, DEC-08 TO DEC-16



Verus⁷⁷

Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Performance statistics

AQR Capital
PanAgora



36 MONTH ROLLING TRACKING ERROR



36 MONTH ROLLING INFORMATION RATIO



36 MONTH ROLLING SHARPE RATIO(G)



Verus⁷⁷⁷

Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Risk vs. return

AQR Capital
PanAgora



TOTAL PERFORMANCE VS. RISK, JAN-14 TO DEC-16

TOTAL PERFORMANCE VS. RISK, JAN-12 TO DEC-16



TOTAL PERFORMANCE VS. RISK, JAN-10 TO DEC-16



TOTAL PERFORMANCE VS. RISK, JAN-07 TO DEC-16



Verus⁷⁷

Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Performance efficiency

AQR Capital PanAgora First Quadrant 60/40 Global Portfolio



EXCESS PERFORMANCE VS. RISK, JAN-14 TO DEC-16

EXCESS PERFORMANCE VS. RISK, JAN-12 TO DEC-16



EXCESS PERFORMANCE VS. RISK, JAN-07 TO DEC-16



EXCESS PERFORMANCE VS. RISK, JAN-10 TO DEC-16



Verus⁷⁷

Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Up & down market analysis

AQR Capital
PanAgora
First Quadrant

♣ 60/40 Global Portfolio

36 MONTH ROLLING UP MKT CAPTURE RATIO



% OF POSITIVE MONTHS AND SIZE OF GAIN, MAR-09 TO DEC-16



36 MONTH ROLLING DOWN MKT CAPTURE RATIO



% OF NEGATIVE MONTHS AND SIZE OF LOSS, MAR-09 TO DEC-16





Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Correlations

Correlation, Jan 09-Dec 16	AQR Capital	PanAgora	First Quadrant
AQR Capital		0.88	0.91
PanAgora	0.88		0.90
First Quadrant	0.91	0.90	
Cash	0.11	0.10	0.17
US Equity	0.49	0.54	0.61
Intl Equity	0.54	0.55	0.64
EM Equity	0.60	0.59	0.68
US Rates	0.33	0.41	0.25
Non-US Rates	0.64	0.65	0.65
Credit	0.64	0.63	0.56
High Yield	0.58	0.53	0.61
EM Bond	0.70	0.74	0.74
REITS	0.58	0.69	0.65
TIPS	0.65	0.66	0.64
Commodities	0.58	0.42	0.59
60/40 Global Portfolio	0.63	0.66	0.73

Correlation, Jan 12-Dec 16	AQR Capital	PanAgora	First Quadrant
AQR Capital		0.88	0.91
PanAgora	0.88		0.90
First Quadrant	0.91	0.90	
Cash	0.07	0.03	0.11
US Equity	0.49	0.45	0.52
Intl Equity	0.55	0.51	0.61
EM Equity	0.66	0.58	0.67
US Rates	0.41	0.63	0.39
Non-US Rates	0.54	0.61	0.57
Credit	0.68	0.81	0.69
High Yield	0.70	0.60	0.71
EM Bond	0.75	0.77	0.78
REITS	0.63	0.78	0.70
TIPS	0.70	0.77	0.67
Commodities	0.57	0.27	0.49
60/40 Global Portfolio	0.66	0.64	0.71



IV. Appendix - manager combinations



Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Performance to date - as of December 2016

● AQR / PanAgora ● AQR / FQ ● PanAgora / FQ + 60/40 Global Portfolio



PERFORMANCE TO DATE

EXCESS ANNUALIZED RETURN TO DATE, %	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
AQR / PanAgora	7.0	7.0	3.0	-0.4	3.0	3.6
AQR / FQ	8.6	8.6	3.2	-0.6	2.4	
PanAgora / FQ	7.3	7.3	0.5	-3.1	0.9	



Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Calendar year performance



ANNUAL PERFORMANCE



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Performance summary - as of December 2016

	AQR / PanAgora	AQR / FQ	PanAgora / FQ	60/40 Global Portfolio
Statistics (5 Years)				
Annualized Return, %	5.9	5.8	3.3	6.4
Annualized StdDev, %	7.9	8.5	8.1	7.5
Sharpe Ratio	0.8	0.7	0.4	0.9
Avg Loss, %	-2.0	-2.2	-2.0	-1.6
Loss Frequency, %	36.7	35.0	40.0	40.0
Max Drawdown Return, %	-10.9	-10.4	-15.1	-7.2
Max Drawdown Period	May-15 - Dec-15	May-13 - Jun-13	Sep-14 - Dec-15	Sep-14 - Jan-16
Recovery Period	Jan-16 - Jun-16	Jul-13 - Feb-14	Jan-16 - Sep-16	Feb-16 - Jul-16
Skewness	-0.6	-0.5	-0.6	-0.2
Excess Kurtosis	0.8	1.1	0.2	
Returns to Date				
1 Year	12.4	14.1	12.8	5.5
3 Year	5.3	5.6	2.9	2.3
5 Year	5.9	5.8	3.3	6.4
7 Year	8.8	8.1	6.6	5.7
10 Year	7.5			3.9
Common (Mar-09)	10.1	9.7	8.6	9.6
Calendar Year Returns				
2016	12.5	14.1	12.8	5.5
2015	(6.2)	(5.9)	(8.6)	(1.6)
2014	10.9	9.5	5.6	3.2
2013	0.6	1.0	(1.9)	14.2
2012	13.5	11.3	10.1	11.3
2011	12.0	10.1	10.8	(0.9)
2010	20.5	18.5	20.2	9.6
2009	10.5			20.7
2008	(10.3)			(24.9)
2007	15.7			9.4
2006	1.1			14.6



Performance statistics

● AQR / PanAgora ● AQR / FQ ● PanAgora / FQ ♣ 60/40 Global Portfolio



EXCESS PERFORMANCE VS. RISK, MAR-09 TO DEC-16

36 MONTH ROLLING BETA TO MSCI WORLD, DEC-08 TO DEC-16



MAX DRAWDOWN RETURN, MAR-09 TO DEC-16



36 MONTH ROLLING BETA TO BARCLAYS GLOBAL AGG, DEC-08 TO DEC-16



Verus⁷⁷⁷

Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Risk and correlation - as of December 2016

● AQR / PanAgora ● AQR / FQ ● PanAgora / FQ ◆ 60/40 Global Portfolio

36 MONTH ROLLING RISK, DEC-08 TO DEC-16



36 MONTH ROLLING CORRELATION TO GLOBAL 60/40, DEC-08 TO DEC-16



Verus⁷⁷⁷

Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Performance statistics

AQR / PanAgora

AQR / FQ = PanAgora / FQ = 60/40 Global Portfolio



36 MONTH ROLLING TRACKING ERROR



36 MONTH ROLLING INFORMATION RATIO



36 MONTH ROLLING SHARPE RATIO(G)



Verus⁷⁷

Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Risk vs. return

AQR / PanAgora 🔵 AQR / FQ PanAgora / FQ ♣ 60/40 Global Portfolio



TOTAL PERFORMANCE VS. RISK, JAN-14 TO DEC-16





TOTAL PERFORMANCE VS. RISK, JAN-12 TO DEC-16



TOTAL PERFORMANCE VS. RISK, JAN-07 TO DEC-16





Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Performance efficiency

AQR / PanAgora AQR / FQ PanAgora / FQ 60/40 Global Portfolio



EXCESS PERFORMANCE VS. RISK, JAN-14 TO DEC-16





EXCESS PERFORMANCE VS. RISK, JAN-10 TO DEC-16



EXCESS PERFORMANCE VS. RISK, JAN-07 TO DEC-16





Index: 60% MSCI World 40% BC Global Agg Returns: Gross of Fees Data Source: eVestment Alliance Universe: eA Global Tactical Asset Allocation

Up & down market analysis

● AQR / PanAgora ● AQR / FQ ● PanAgora / FQ 🕈 60/40 Global Portfolio

36 MONTH ROLLING UP MKT CAPTURE RATIO



% OF POSITIVE MONTHS AND SIZE OF GAIN, MAR-09 TO DEC-16



36 MONTH ROLLING DOWN MKT CAPTURE RATIO



% OF NEGATIVE MONTHS AND SIZE OF LOSS, MAR-09 TO DEC-16





Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation

Correlations

Correlation, Jan 09-Dec 16	AQR / PanAgora	AQR / FQ	PanAgora / FQ
AQR / PanAgora		0.98	0.97
AQR / FQ	0.98		0.97
PanAgora / FQ	0.97	0.97	
Cash	0.11	0.14	0.15
US Equity	0.53	0.59	0.57
Intl Equity	0.57	0.61	0.61
EM Equity	0.61	0.65	0.66
US Rates	0.38	0.33	0.29
Non-US Rates	0.67	0.66	0.66
Credit	0.66	0.61	0.61
High Yield	0.57	0.59	0.61
EM Bond	0.74	0.76	0.74
REITS	0.66	0.69	0.63
TIPS	0.67	0.66	0.66
Commodities	0.51	0.52	0.60
60/40 Global Portfolio	0.67	0.72	0.70

Correlation, Jan 12-Dec 16	AQR / PanAgora	AQR / FQ	PanAgora / FQ
AQR / PanAgora		0.98	0.97
AQR / FQ	0.98		0.97
PanAgora / FQ	0.97	0.97	
Cash	0.05	0.07	0.09
US Equity	0.48	0.50	0.52
Intl Equity	0.54	0.57	0.59
EM Equity	0.64	0.64	0.68
US Rates	0.55	0.52	0.41
Non-US Rates	0.60	0.61	0.57
Credit	0.77	0.77	0.70
High Yield	0.67	0.67	0.72
EM Bond	0.78	0.80	0.78
REITS	0.73	0.76	0.68
TIPS	0.76	0.74	0.70
Commodities	0.43	0.39	0.54
60/40 Global Portfolio	0.67	0.69	0.70


V. Glossary of terms



Index: 60% MSCI World 40% BC Global Agg <u>Returns</u>: Gross of Fees <u>Data Source</u>: eVestment Alliance <u>Universe</u>: eA Global Tactical Asset Allocation StanCERA AA Implementation - Risk Parity Search February 28, 2017 68

Glossary

Alpha (a): The excess return of a portfolio after adjusting for market risk, usually attributable to the selection skill of the portfolio manager. Alpha = Excess Return – (Beta x Excess Market Return).

Annualized Return: Converts the Total Return to an annual basis for comparison purposes. Periods shorter than one year are not annualized.

Benchmark: Investment index used as a standard by which to measure the relative performance of an overall portfolio or an individual money manager. Appropriate benchmarks are selected based on their similarity to a portfolio or to the style of the individual money manager being measured.

Benchmark R-squared: Measures how well the Benchmark return series fits the manager's return series. The higher the Benchmark R-squared, the more appropriate the benchmark is for the manager.

Beta (b): A measure of systematic, or market risk; the part of risk in a portfolio or security that is attributable to general market movements. Beta is calculated by dividing the covariance of a security by the variance of the market.

Book-to-Market: The ratio of book value per share to market price per share. Growth managers typically have low book-to-market ratios while value managers typically have high book-to-market ratios.

Calmar Ratio - The Calmar Ratio is a risk/return ratio that calculates return on a downside risk adjusted basis. Similar to other efficiency ratios it balances return in the numerator per unit risk in the denominator. In this case risk is characterized by the Maximum Drawdown.

Capture Ratio: A statistical measure of an investment manager's overall performance in up or down markets. The capture ratio is used to evaluate how well an investment manager performed relative to an index during periods when that index has risen/fallen. The capture ratio is calculated by dividing the manager's returns by the returns of the index during the up/down market, and multiplying that factor by 100.

Correlation Coefficient (r): A measure of the relative movement of returns of one security or asset class relative to another over time. A correlation of 1 means the returns of two securities move in lock step, a correlation of -1 means the returns of two securities move in the exact opposite direction over time. Correlation is used as a measure to help maximize the benefits of diversification when constructing an investment portfolio.

Hurst Exponent: quantifies the relative tendency of a time series either to regress the mean. A value H in the range 0.5 < H < 1 indicates a time series with long-term positive autocorrelation, meaning a high value in the series will probably be followed by another high value . A value in the range 0 < H < 0.5 indicates a time series with long-term switching between high and low values in adjacent pairs, meaning that a single high value will probably be followed by a low value. A value of H=0.5 can indicate a completely uncorrelated series.

Excess Correlation: Correlation of the excess returns (above the benchmark).

GARP: Growth-At-A-Reasonable-Price. Equity strategy that combines tenets of both growth and value investing, looking for companies with above average earnings growth but excluding those with high valuations.

Information Ratio: A measure of a manager's ability to earn excess return without incurring additional risk. Information ratio is calculated as: alpha divided by tracking error.



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Glossary

Kurtosis (excess returns)- Kurtosis describes whether the series distribution is peaked or flat and how thick the tails are as compared to a normal distribution. Positive kurtosis indicates a relatively peaked distribution near the mean and tends to decline rapidly and have fat tails. Negative kurtosis indicates a relatively flat distribution near the mean.

Long Term Reversal Factor: Risk premium associated with buying past losers and selling past winners (five year time horizon).

Low Volatility: Risk premium generated by picking low volatility stocks, measured by the MSCI USA Minimum Volatility Index.

Momentum Factor: Risk premium associated with buying past winners and selling past losers.

Portfolio Turnover: The percentage of a portfolio that is sold and replaced (turned over) during a given time period. Low portfolio turnover is indicative of a buy and hold strategy while high portfolio turnover implies a more active form of management.

Predicted Style R-squared: Measures how well the manager's predicted style fits the manager's return series. Adding many unnecessary indices will not improve the Predicted Style R-Squared. The methodology essentially predicts the manager's style at each point in time without the data at that point with the rationale being that if the style estimates obtained so far are good, then they can be used to predict the style at the estimation point.

Price-to-Earnings Ratio: Also called the earnings multiplier, it is calculated by dividing the price of a company's stock into earnings per share. Growth managers typically hold stocks with high price-to-earnings ratios whereas value managers hold stocks with low price-to-earnings ratios.

Quality: The quality factors measured the manager's exposure to high quality stocks versus low quality stocks as defied by S&P. The factor is constructed by combining a long position in the S&P 500 High Quality index and short position S&P 500 Low Quality index.

Regression Based Asset Loadings: Represents the exposure period of an investment product (called a Manager, Fund, or Index in Stylus) to various explanatory variables. It is also referred to as Style Indices or Asset Classes. These Indices can be interpreted as the Manager Betas or risk factors at a given point in time.

Risk Premium: An expected return in excess of the risk-free rate. The premium provides compensation for the assumption of risk.

Risk-Free Rate: The rate of interest that one can earn on an investment with no default risk. It is generally assumed to be the interest rate on a 91 day T-Bill.

R-Squared: Also called the coefficient of determination, it measures the amount of variation in one variable explained by variations in another. In the case of investments, the term is used to explain the amount of variation in a security or portfolio explained by movements in the market or the portfolio's benchmark.

Selection return: The difference between the Manager and the Manager's Style Return.

Sharpe Ratio: A measure of portfolio efficiency. The Sharpe Ratio indicates excess portfolio return for each unit of risk associated with achieving the excess return. The higher the Sharpe Ratio, the more efficient the portfolio. Sharpe ratio is calculated as: Portfolio Excess Return / Portfolio Standard Deviation.

Short Term Reversal Factor: Risk premium associated with buying past losers and selling past winners (two month time horizon).

Significance Level (Excess Returns) - The Significance Level of a test is the probability that the test statistic will reject the null hypothesis when the hypothesis is true. Significance is a property of the distribution of a test statistic, not of any particular draw of the statistic.



Glossary

Size Factor: Risk premium associated with buying small companies.

Skewness (Excess Returns)- Skewness describes the degree of asymmetry of a distribution around its mean. A distribution is said to be symmetric if has the same shape to both the left and right of the mean. A perfectly symmetrical distribution has a Skewness of 0. A positively skewed distribution has larger gains than losses, while a negatively skewed distribution has a longer tail of losses.

Standard Deviation (s): A measure of volatility, or risk, inherent in a security or portfolio. The standard deviation of a series is a measure of the extent to which observations in the series differ from the arithmetic mean of the series. For example, if a security has an average annual rate of return of 10% and a standard deviation of 5%, then two-thirds of the time, one would expect to receive an annual rate of return between 5% and 15%.

Style Analysis: A return based analysis designed to identify combinations of passive investments to closely replicate the performance of funds.

Style Map: A specialized form or scatter plot chart typically used to show where a Manager lies in relation to a set of style indices on a two-dimensional plane. This is simply a way of viewing the asset loadings in a different context. The coordinates are calculated by rescaling the asset loadings to range from -1 to 1 on each axis and are dependent on the Style Indices comprising the Map.

Style Returns: The sum of the Return of each Style Asset multiplied by its weight for the time period.

Style R-squared: Measures how well the estimated Manager's style return series fits the manager's return series. The higher the Style R-squared, the better the fit between the manager's style and return series.

Total Return: Total Return geometrically compounds the Returns in the series from one period to the next.

Tracking Error/Excess Standard Deviation: The standard deviation of the difference between the rate of return of a portfolio and its benchmark.

Treynor Ratio - The Treynor Ratio is defined as the ratio of the manager's excess geometrically annualized return over the portfolio Beta. Excess returns are computed versus the cash index.

Universe: Also called a peer group, a universe is a large number of portfolios of a similar style. These portfolios can be divided into deciles or quartiles and then used for performance measurement and comparative purposes. Portfolios are ranked within the universe, which tells the investor how well a manager has done relative to his or her peers.

Value: Refers to the style of an equity manager. A value manager seeks to create returns by purchasing stocks selling at a discount to their true or intrinsic value. Typical portfolio characteristics of this strategy include a low price-to-earnings ratio, high book-to-market ratio, and high dividend yield.

Valuation Factor: Risk premium associated with buying companies trading at a low price/book multiple.

VIX : VIX is a trademark ticker symbol for the Chicago Board Options Exchange Market Volatility Index, a popular measure of the implied volatility of S&P 500 index options. Often referred to as the fear index or the fear gauge, it represents one measure of the market's expectation of stock market volatility over the next 30 day period.



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